The effects of induced negative mood state on recalled autobiographical content and memory

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by

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ABSTRACT

Autobiographical memory has been theorized to serve as an adaptive function in coping with negative mood state. To gain a better understanding of whether autobiographical memory changes with negative mood state, a number of experiments examined the relative accessibility of cognitive content and ability to recall specific event memories in those who had a previous history of depression or showed some aspects of current depressive symptoms.

Five separate studies involved 288 participants and examined the effects of negative mood components on autobiographical recall. Studies 1 – 4 examined the autobiographical content by cueing content using a cue word technique to evoke autobiographical memories by means of a modified version of the Autobiographical Memory Test (AMT; Williams & Broadbent, 1986). Negative mood state was induced by Velten mood induction technique, and self-reported mood was measured using University of Wales Institute of Science and Technology Mood Adjective Checklist (UWIST-MACL; Matthews, Jones & Chamberlain, 1990) before and after mood induction. The ability to recall specific event memories was measured in Study 5 by the Sentence Completion for Events from the Past Test (SCEPT; Raes, Hermans, Williams, & Eelen, 2007).

The results indicate that negative mood does influence autobiographical recall in terms of content and memory. These results indicate that autobiographical memory is a phenomenon that is in part dependent on negative mood state and in part dependent on current depressive symptoms and history of depression. Increased rumination was particularly responsive to induced negative mood state in those with current depressive symptoms. Reduced levels of activity, alertness, loss of interest and diminished pleasure are aspects of negative mood that seem to be particularly important components of mood state at the time of recall. To gain further insights into mood state effects in autobiographical recall, future directions in mood research should focus on and differentiate between the separate mood state components that are more important in bringing about changes in recalled content, especially in those with either a history of depression or showing current depressive symptoms.

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CHAPTER 1
LITERATURE REVIEW

1.1 Introduction

The general aims of this thesis are to investigate the effects of mood state on the content of recalled autobiographical memories. This introductory chapter reviews previous theoretical and empirical work examining autobiographical memory. Theoretical review starts by examining the characteristics and structure of autobiographical memory, paying particular attention to the 'autobiographical knowledge base' (Conway & Pleydell-Pearce, 2000). Autobiographical memory is hierarchically organised in an interlinked network of increasing sensory (i.e. memory for vividness and perceptual qualities) and affective information (i.e. mood and emotional aspects) associated with the memory event. Specific memories have high sensory and affective qualities and include contextual details such as time, place, person, whereas general memories lack sensory and affective qualities and contextual details. The empirical work falls into two main areas: 1) the influence of negative mood on triggering previous cognitive content associated with that similar mood state; 2) the influence of mood on type of memory that is recalled with reference to sensory, affective and contextual detail, so-called overgeneral memory when lacking such qualities. The first three empirical chapters report on the development of a sufficiently sensitive procedure to examine cognitive content involved in autobiographical memories. The last two empirical chapters examine general versus specific memories, firstly using the cued autobiographical memory procedure, and secondly using the sentence completion procedure to examine the effects of mood on type of autobiographical memories.

1.2 Autobiographical memory characteristics

The term autobiographical memory refers to be an individual's record of experiences from his/her personal life in the form of an internal life story, which is a construction of past experiences (Williams, Barnhofer, Crane, Herman, Raes, Watkins & Dalgleish, 2007). Research suggests that mood states influence the

manner in which the record of experience is processed, evaluated and recalled (Holland & Kensinger, 2010). Memory recall is thought to be influenced by mood congruence i.e. that mood states might influence the priming of similarly affective memories to the current mood state at the time of recall (Federmeier, Kirson, Moreno & Kutas, 2001; Isen, 1999). Another approach suggests that mood influences a number of processes in memory recall e.g. vividness, sensory detail and emotionality (Kensigner & Schacter, 2006). This stream of research focuses structural organization of the memory system. The organization has been conceptualised as a continuum, with general information held at one end and specific information at the other end (Conway, 2005). The distinction is between general memories versus specific memories. Autobiographical memory research has indicated that some psychopathology maybe associated with a difficulty in retrieving specific autobiographical memories (Sumner, Griffith & Mineka, 2010).

A key characteristic of autobiographical memory is that it focuses on personal experience (Conway, 1990). Autobiographical memories tend to entail a greater degree of personal material than other memories which act as an identifying feature of such memories. Additionally the experience of remembering tends to be always present i.e. the experience of reflecting upon a past personal event demonstrates that the person doing the remembering plays a central part in the remembered memory and is able to refer to the time, place, persons involved and date of the event. The veridicality represents the reported accuracy or trueness of the remembered content and seems to vary in relation to how important that event is to that individual. Conway (1990) argued that autobiographical memories do not constitute a veridical record of an experienced event but rather are interpretations of events that are never true in the sense that they are literal representations of events. Specific event autobiographical memories tend to feature sensory information, such as remembering being hot or cold or whether it was a bright or dark day, and affective information, such as feeling happy or sad and whether it was exciting or boring. Table 1a (on the next page) lists ways that autobiographical memories are different from episodic or

semantic memories.

Table 1a: Characteristics of autobiographical memory

	Memory type Autobio-graphical memory	Episodic memory	Semantic memory
Self reference	High	Low	Rare
Experience of remembering	Always present	Usually but not always present	Rarely present
Interpretation (personal)	Frequently present	Rare	Rare
Veridicality consensus	Variable	High	Social more important
Duration of memory	Usually event specific	Usually lifetime periods	Lifetime
Context specific sensory and perceptual attributes	Always present	Always present	Never present
Imagery	Frequently present	Frequently present	May be present but rare
Affective present in event-specific memory	Always	Low	Rare

Table adapted from Conway (1990, p14)

It should also be recognised that there is a certain amount of overlap between autobiographical, episodic and semantic memory because the retrieval of autobiographical memory containing personal experience may also involve the use of episodic and semantic memory and vice versa (Conway, 1990). For example, giving someone the memory cue ‘school’ might start a search involving semantic information on what is the nature of school and recalling episodic memories of school, which then might lead to event-specific memories of a personal experience that happened when they were at a specific school.

1.3 Autobiographical memory structure

According to Conway (1996) autobiographical memory is a specific form of memory involving an individual's record of experiences from his/her personal life, which is used to construct past experiences. It is believed that autobiographical memory is arranged in a hierarchy – a series of ordered grouping of memories within a system – with lifetime periods which are arranged around themes (Conway, 1996). For example, we can place an event in a particular period because we remember that it occurred while we were in primary school, or more specifically because it was just after we got married. Themes can range from distinctive and unique, which would be at the bottom of the hierarchy (such as 'my first job'), to the other side of the continuum towards themes that are repeated, such as my 'journeys to and from work', which are classified as subordinate themes. Conway (1996) further suggests that the next level down contains specific knowledge about an event which it is argued contains information from senses and affective mood states.

Therefore, memory recollection could be seen as on a continuum from general memories without sensory and affective information to specific events with sensory and affective information evident. Such a hierarchy would suggest that general memories would be accessed more frequently than specific events. Williams et al. (2007) suggested that because of the frequency of rehearsal of general memories compared to specific memories, the latter are less easily recalled. Furthermore, Williams & Dritschel (1992) argued that specific memories include contextual details such as time, place, person and action which act as identification tags, whereas general memories lack contextual details and therefore lack or have fewer identification tags. For example, general memories lack temporal detail of the timing (e.g. the skiing holiday in France), sometimes called "extended memories", which have consequently been accessed and rehearsed less because of the lack of temporal detail. Another category of general memory also lacks temporal location, but rather than describing an extended period focuses on a number of periods of similar lifetime themes (e.g. going to the supermarket), sometimes called 'categoric memories', which pull

together routines and commonalities. Particular episodic autobiographical memories in our personal past tend to have time and place specific information about a specific episode, whereas some memories only contain knowledge about facts or names. These factual or so-called ‘semantic memories’ tend to have unique knowledge about facts, but lack the temporal qualities of episodic autobiographical memories (e.g. name of the primary or secondary school you attended).

The cognitive processes underlying recall of autobiographical memories are thought to be under generative or direct mechanisms (Conway & Pleydell-Pearce, 2000). Generative retrieval is hypothesised as starting with a general lifetime themes search which could successfully end with event-specific knowledge. Retrieval following this pattern is a conscious, effortful and controlled process. Direct or so-called spontaneous retrieval is when event-specific knowledge is directly activated by unprompted memory cues. This is automatic rather than a conscious process. The structure and proposed mechanisms for recalling autobiographical memories have been suggested by Conway & Rubin (1993). The Conway & Rubin (1993) structure indicates that autobiographical memory is organised in an interlinked network of specificity ranging from the lifetime periods to general memories and ending at specific events holding sensory and affective information (Figure 1 on the next page).

Figure 1: The structure of Autobiographical Memory

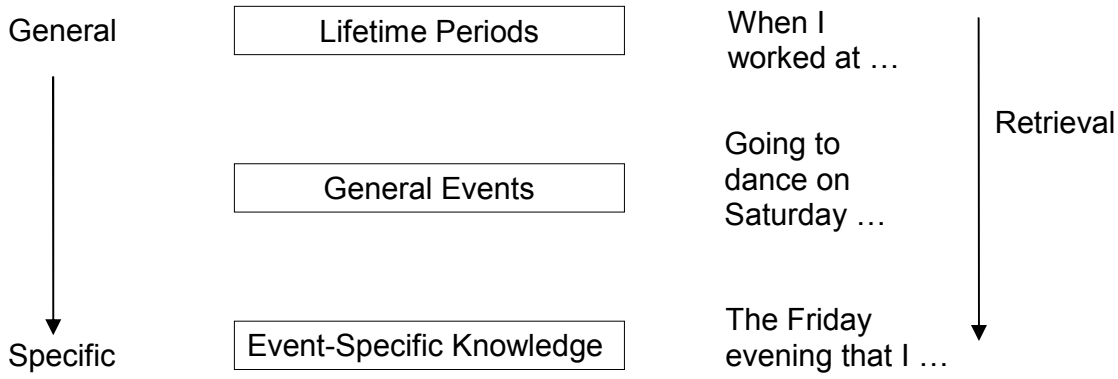


Figure adapted from Conway & Rubin (1993)

According to the Conway & Rubin (1993) model, the process of memory recall is a dynamic and strategic cognitive operation involving a number of processes including monitoring and verification. The monitoring and verification refers to the iterative process of checking the memory against similar memories and looking for event-specific information. It is thought that autobiographical retrieval carries not only the knowledge into consciousness but activates some affective components associated with the original event. However, rather than affect being fully dependent on the consequences of an event, it is recognised that affect is also generated by the type of memory processing (Hayes, Conway & Morris, 1992).

1.3.1 Word cueing technique to elicit autobiographical memories

The cue word technique involves the participant being supplied with a cue word and asked to recall a memory associated with that word. Sometimes instructions are given to the participant to elicit a specific event memory by asking for a memory that happened to them that lasted for less than a day (Williams et al.,

2007). The Autobiographical Memory Test (AMT; Williams & Broadbent, 1986) was developed to assess autobiographical memory by using cue words (see Figure 2).

Figure 2: Hierarchy processes in cued autobiographical retrieval using a cue word technique

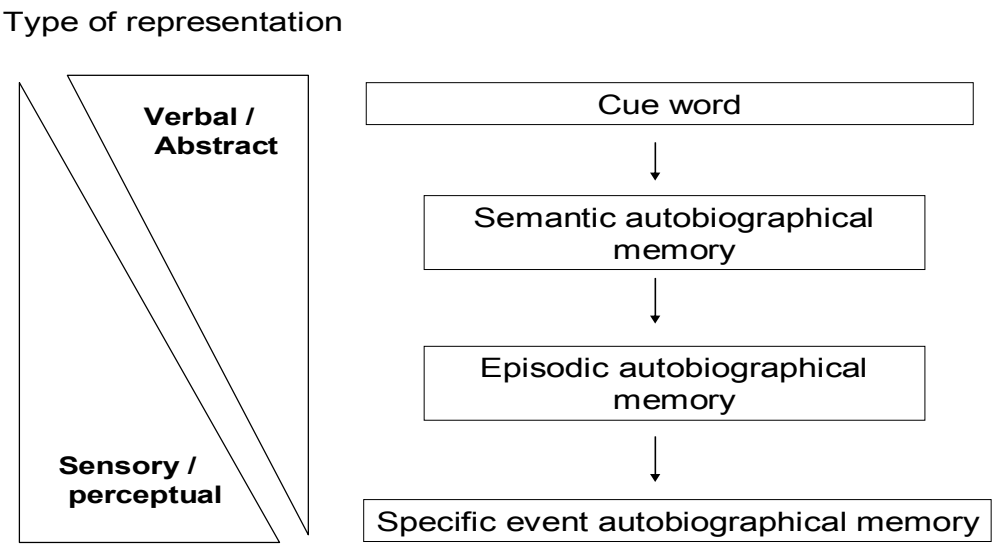


Figure adapted from Williams, Barnhofer, Crane, Herman, Raes, Watkins & Dalgleish (2007)

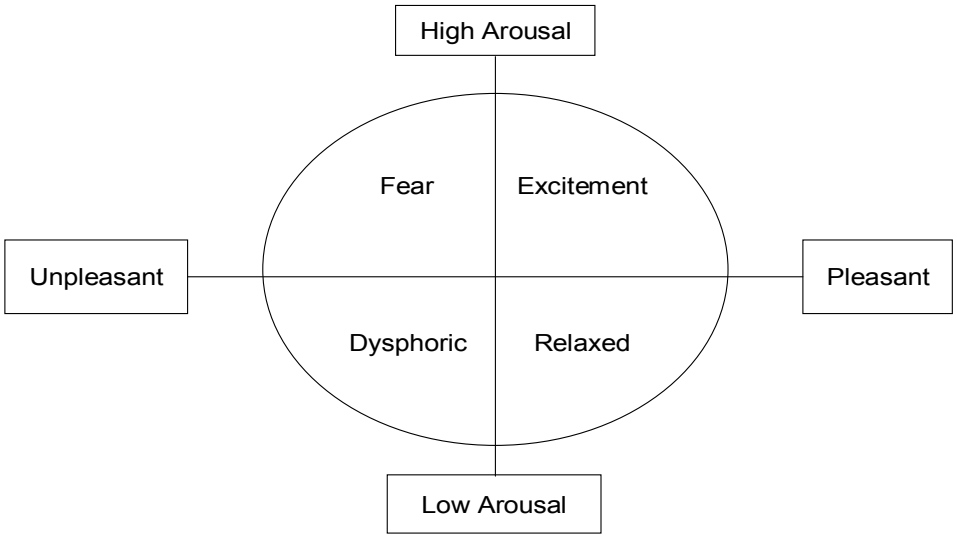
Cue words can be relatively emotive words (i.e. death, torture, bomb) or more neutral words (paper, hat, log). It is possible to measure objective aspects of autobiographical memory (response latencies and recent or remote events) and subjective characteristics (ratings of arousal, vividness, valence, etc). The technique has been found to be relatively robust across variations in the cueing procedure (Williams et al., 2007).

1.4 Mood states and mood state induction

1.4.1 Multi dimensions of mood

Understanding of mood state is thought to require a multiple dimensional understanding rather than a unitary conceptualization of mood (Matthews, Jones & Chamberlain, 1990). Multiple dimensional understanding of mood state has a number of affective components ranging from unpleasant to pleasant emotions (valence component) and from low to high arousal (arousal component). Mood states (or affective states) can be characterised by a circumplex containing the two dimensions of valence and arousal (Matthews et al., 1990; see Figure 3).

Figure 3: Dimensions of affect (adapted from Matthews, Jones & Chamberlain, 1990)



Pleasant emotions are those that are experienced as desirable and involve meeting basic hedonic needs, whereas unpleasant emotions are those experienced as repugnant and do not meet hedonic needs (Matthews et al., 1990). Individuals experiencing sadness, unhappiness and loneliness are positioned on negative valence (unpleasant mood). Depressed mood is characterized by negative valence, or sometimes called low hedonic tone (Flett,

Vredenburg & Krames, 1997). There is a similar continuum between high and low arousal (Matthews et al., 1990). Individuals experiencing inactiveness, passiveness and apathy are positioned on a lack of energy (low arousal). Depressed mood is characterized by low arousal (Flett et al., 1997). Arousal, unlike valence, is difficult to label as ‘positive’ or ‘negative’, as it is often dependent on the situation. For example, a drop in arousal when relaxing might be experienced as pleasant prior to sleep but unpleasant when about to embark on an enjoyable but energetic task (Figure 3).

1.4.2 Mood induction techniques

A review of mood induction procedures included the following main categories of induction: Imagination, Velten, Film, Music, Social Interaction, Gift and Facial Expression (Westermann, Spies, Stahl & Hesse, 1996). Imagination technique involves imagining or remembering situations or events in order to evoke the intended mood. The Velten technique uses self-referent statements describing positive or negative self-statements. Film technique involves showing a short clip and asking participants to imagine the situation and 'get involved' in the feelings suggested. Music technique involves listening to classical or modern music and being instructed to get into the mood expressed by the music. Social Interaction technique involves the experimenter manipulating the immediate environment in order to induce emotional states. The Gift and Facial Expression techniques involve the experimenter giving a small gift or asking the participant to show a facial expression that matches the emotional state that is desired.

The techniques can be grouped under three main headings: imagining procedures, interpersonal procedures and suggestive techniques (Clark, Beck & Alford, 1999). Those procedures based on imagination include film or story inductions, as both techniques require the participant to imagine emotion-laden events. Imagining procedures involve the induction of mood by requiring the participant to imagine emotional-laden events from their lives (Brewer, Doughtie & Lubin, 1980) or by identifying with emotive situations (Gross & Levensen, 1995). Interpersonal induction procedures include Social Interaction, Gift and

Facial Expression, as these techniques involve some kind of interpersonal interaction as the main catalyst in the procedure. Suggestive techniques, which include the Velten and Music induction procedures, are seen as the most rigorous, as these techniques avoid priming specific events and can allow standardization in the induction procedure.

A combination of mood induction techniques has been used to possibly enhance the desired mood state (Teasdale & Dent, 1987; Yeung, Dalgleish, Golden & Schartau, 2006). When choosing a mood induction procedure, it is important to select a technique that will not interfere with the dependent variables under observation (Westermann et al., 1996). For instance, a film or story may prime cognitions that are related to the film or story. It may be important for a researcher looking at cognitive content to avoid mood induction procedures that involve such techniques (Westermann et al., 1996), as the content elicited may reflect the cognitive content in the mood induction – in this case the film clip – rather than that produced by the associated mood state.

1.4.3 Velten mood induction technique

The Velten procedure has been used extensively by researchers interested in mood and cognition in experimental situations (Kenealy, 1986). The procedure involves participants reading a list of sixty graduated self-referent statements. In Velten's (Velten, 1968) original study, subjects read 60 self-referent statements related to three specific mood states – depression, elation and neutral – and allocated to each of these three conditions. The study included two further groups involving acting depressed and acting elated as a means of controlling demand characteristic. The seven dependent measures included seven tasks, including Multiple Affect Adjective Checklists (MAACL), word association and spontaneous verbalisations. The results showed significant differences between depression and elation in five of the seven measures. The study demonstrated that the Velten technique had induced the required mood, whereas the demand characteristic groups showed no significant difference in mood.

The Velten technique has certain strengths as a mood induction technique, and been used extensively (Baker & Guttfreund, 1993; Bates, Thompson & Flanagan, 1999; Sinclair, Mark, Enzle, Borkovec & Cumbleton, 1994). The procedure accommodates group administration, and the negative mood induction procedure of the techniques has been shown to mimic depressed mood state (Scher, Ingram & Segal, 2005). There are a number of advantages to group administration, such as the group procedure is more homogenous than individual administration and has the benefit of collecting a large amount of data with the minimum time period (Bates et al., 1999).

The negative state produced by the technique has been shown to effectively produce a mood change with similar characteristics to depressive states (Goodwin & Williams, 1982). This is important to researchers interested in making connections between induced mood state and pathological states. It has been noted that mood induction procedures seem to induce cognitive content similar to the depressed state (Scher et al., 2005). The cognitive response to the negative mood state, or so-called cognitive reactivity, has been defined as the relative ease with which maladaptive cognitions or cognitive styles are triggered by mild (non-pathological) mood fluctuations.

The review of mood induction procedures indicates some heterogeneity in the type of mood induction procedures used in previous research. The most cited mood induction technique was Velten mood induction procedure. Velten technique allows standardization, and can be argued to be the most rigorous technique in inducing a mood state. It has advantages which enable group administration. This facilitates a homogenous procedure which mitigates procedural anomalies.

1.5 Two theoretically important mood state phenomena

Investigating the mood state effects evoked by mood induction techniques is an essential aspect of discovering mood effects on autobiographical memories but a clearer understanding of important mood state phenomena could provide a

theoretical understanding to any mood state effects observed in autobiographical memory. Mood state is thought to affect the manner in which memories are recalled and evaluated by facilitating recall or processing of similarly affective memories (Forgas, 1995). There are two theoretically important mood state phenomena that contribute to understanding mood effects on memory recall: mood dependent and mood congruent processing effects.

The first theoretical phenomenon, mood dependent effect, is where the mood state at recall matches the mood state at the time the event was experienced, and is more easily remembered (Kenealy, 1986). According to this, retrieval will be more likely while experiencing the same affective state that was experienced when the memory was encoded. The second theoretical phenomenon, mood congruence, is where a certain mood will tend to enhance processing of memories or stimuli that correspond to the concurrent mood state (Teasdale & Fogarty, 1979). This effect shows an influence of emotion at the retrieval stage; when a person is in a particular mood, they will tend to remember information that is congruent with the concurrent mood. In both cases it is thought that mood state at the time of event and at recall acts like a filter to particular memories of past events. Both state dependent and mood congruent findings show the influence that mood can have on memory. Bower (Bower, 1981 & 1991) argues that mood congruent and state dependency findings can be explained by a Network Theory of Affect.

The notion of mood state dependence suggests that some cognitive constructs, such as dysfunctional assumptions, are non-accessible under normal mood states, but become ‘primed’ by negative mood, which could activate a number of negative cognitive constructs. Dysfunctional assumptions have been the traditional focus of mood related cognitions. The term 'dysfunctional assumption' describes the way in which a person organises his or her experience and perception of the world, which are overly rigid and inflexible and dictates the way he or she deals with new experiences (Williams, Conway & Cohen, 2008). A study by Miranda, Gross, Persons & Hahn (1998) highlighted a problem with the

cognitive theories of clinical depression in that stable beliefs predispose vulnerable individuals to depression. The problem is that when depression remits, the dysfunctional assumptions are either difficult to detect or absent (Miranda et al., 1998). Empirical evidence seems to refute the stability hypothesis, that dysfunctional assumptions are stable, and indicates that some cognitive events appear to covary with depressive symptoms and may only be accessible during negative mood states (Miranda & Persons, 1988).

An important feature of cognitive theories of negative cognitive structures is that they remain latent until activated by an environmental stressor such as primed mood or adverse life event (Beck, 1970). Once the negative cognitive structures are activated, they negatively bias information processing which causes depressed mood (Beck, 1970). Theory proposes that negative cognitive structures need to be activated by an external stressor to produce negative affect. Miranda et al. (1998) propose that the stressor is negative mood state, which activates a variety of negative cognitive structures. These act as facilitators in bringing about depressed symptomatology. The cognitive facilitators are considered to be unstable and surface level cognitions that “effect an independent variable on a dependent variable by various transformation processes inside an active organism” (Kwon & Oei, 1994, p.336). Cognitive facilitators are often interlinked and bias in one cognitive process may affect others as well, such as selective attention, sensory and affective information, memory recall and cognitive structures.

This section has discussed current understanding of key aspects of priming mood and key theoretical aspects of mood state effect on autobiographical memory that could contribute to researchers investigating mood state effect on autobiographical retrieval. Specifically, it has focused on researchers interested in the effect that priming has on broader cognitive content such as appraisal of sensory and affective information rather than traditional measurement of dysfunctional assumptions. Kwon & Oei (1994) have differentiated between stable and transient and surface and deep level cognitions. Dysfunctional

attitudes are seen as linked to stable and deeper level cognitions, whereas automatic thoughts are seen as transient and surface level cognitions (Kwon & Oei, 1994).

1.6 Studies involving primed mood

Investigating mood state effects and techniques for bringing about temporary mood change is a necessary aspect for researchers interested in mood state effects, but a clearer understanding of how mood state effects act upon particular groups with known affective condition could provide a valuable insight into any mood state effects observed in autobiographical memory (van Vreeswijk & de Wilde, 2004). There is more known about the cognitive styles of already depressed individuals but far less about those individuals who are vulnerable to depression by virtue of a previous episode of depression (Scher et al., 2005). Conversely, there is more known about primed mood effects in those with previous history of depression but far less about those that have naturally occurring symptomatology due to dysphoria or clinical depression. This is undoubtedly due to the ethical constraints in inducing negative mood in those with a current mood disorder. The studies which investigate cognitive styles in the already depressed and mood priming in the vulnerable can be subdivided into those using self-reported questionnaires or performance-based measures (Scher et al., 2005). Self-reported questionnaires tend to assess cognitive reactivity by measuring attributes such as cognitive appraisals of autobiographical events, dysfunctional attitudes and automatic thoughts (Scher et al., 2005). In contrast, performance-based measures tend to assess information processing bias, such as dichotic listening tasks, attention deployment and emotional Stroop tasks (Scher et al., 2005). There is some evidence which indicates that vulnerability for depression is sufficient for biased cognitive styles to be visible, while other findings suggest that, in addition to vulnerability, acute negative mood shift is a necessary condition to trigger biased cognitive styles (Yeung et al., 2006). The studies in self-reported questionnaires or performance-based measures in the respective vulnerable and symptomatic categorisation can be used as a springboard for further discussion.

1.6.1 Mood state effects in those with a previous history of depression or so-called vulnerable individuals

Studies such as Miranda & Persons (1988), who used mood priming technique, and Roberts & Kassel (1996), who used naturally occurring mood, demonstrated converging data that cognitive style is related to mood state in vulnerable individuals but not in the non-vulnerable group. The interpretation of these findings is somewhat difficult because they could indicate either that low mood triggers negative cognitive styles or that negative cognitive styles trigger low mood. Miranda & Persons (1998) did test the hypothesis that latent negative cognitions are present in vulnerable individuals but need low mood to activate these cognitive styles, and found evidence to support the hypothesis. In another study, Miranda et al. (1998) used mood induction in vulnerable and non-vulnerable individuals, and examined dysfunctional attitudes under mood stress. The study indicated that increases in negative mood were associated with increased dysfunctional attitudes in vulnerable but not non-vulnerable people. It is interesting to note that the non-vulnerable group decreased their self-rated endorsements of dysfunctional attitudes under mood stress. This finding is difficult to interpret without considering the effect on a broader range of cognitive processes, such as attention and memory changes.

The self-reported questionnaire technique and assessing endorsements of attitudinal change has been the main research technique to assess cognitive reactivity (Segal, Kennedy, Gemar, Hood, Pedersen & Buis, 2006). The use of a mood prime combined with self-rating of adjectives or dysfunctional attitudes has been used to assess what has become more recently known as mood state dependence. The technique has been utilised by many researchers, including Teasdale & Dent (1987), who investigated mood dependence in recovered and never-depressed participants using a word adjective rating technique before and after a mood prime. The findings suggested that recovered depressed participants recalled more negative adjectives than never-depressed participants. The authors also found that recovered depressed participants did not differ from

never-depressed participants in a normal mood state prior to mood induction. Analogous results have been reported by Miranda & Persons (1988) and Gemar, Segal, Sagrati & Kennedy (2001), both of which teams used the dysfunctional attitude scale to assess cognitive reactivity. The former study investigated dysfunctional attitudes in women with a prior history of depression. The analysis indicated that post Velten procedure, dysfunctional attitudes increased with negative mood only for participants with a history of depression. Similarly, the latter study investigated mood-induced changes in never and recovered depressed groups, and found that, after mood induction, formerly depressed compared to never-depressed people had greater incidence of reported dysfunctional attitudes.

There have been a number of studies focusing on self-reported techniques by manipulating the valence of memory cues and assessing the resultant autobiographical content evoked. Eich, Macaulay & Ryan (1994) investigated subjects' memory for previously generated events, which were better when mood at testing matched the mood at generation. The results supported mood dependent memory, and indicated that internal states such as mood can generate mood dependent recall. Gillihan, Kessler & Farah (2007) used a random assignment to memory valence with participants blind to their assignment. Depending on the questionnaire received, the subjects were asked to report memories that were positive, neutral, or negative. The findings suggested that valence does indeed exert a mood-altering effect on memory recall, and may do so even without the individual's awareness. Isen, Shalker, Clark & Karp (1978) investigated the effect of good mood on cognitive processes. The mood was evoked by winning a computer game. The authors found that subjects who had an induced positive mood were better able to recall positive material in memory.

1.6.2 Mood state effects in those with current symptoms of depression or so-called symptomatic individuals

The empirical evidence from primed mood research and memory performance in those with symptomatology or previous vulnerability is relevant to researchers investigating mood state effects on autobiographical recall. Depressive symptomatology, or those individuals with a previous history of depression who might not be showing current symptomatology, are possible moderating factors that might influence mood state effects in memory recall. A number of studies suggest that individuals who have a previous history of depression or symptoms of depression have a greater increase in negative thinking following negative mood prime than never-depressed individuals when using self-reported endorsements (Persons & Miranda, 1992; Teasdale & Dent, 1987). Persons & Miranda (1992) argue that unhelpful beliefs in memory develop in a negative affective state and become linked to this negative mood state in memory. Therefore, unhelpful beliefs that are strongly linked to a mood state in memory remain latent unless the associated mood state is also activated. Persons & Miranda (1992) argue that a failure to find cognitive reactivity, i.e. the ease with which cognitions are triggered by mood fluctuations, in some studies is because they have either failed to check for the presence of symptomatology or failed to prime a negative mood state. For example, Dykman (1997) investigated negative priming in recovered and never-depressed groups to see what impact mood has on facilitating access to latent dysfunctional attitudes. The findings showed that there was no significant difference in dysfunctional attitudes between the two groups. The null findings might be down to the absence of checking of current depressive symptoms. For instance, even mild symptomatology in never-depressed people may already be producing reactivity prior to negative priming. Again, Brosse, Craighead & Craighead (1999) investigated the effects of mood amongst previously depressed and never depressed individuals, and found a significant relationship between primed mood and cognitive reactivity. However, they did not find any difference between previously depressed and never depressed. The study could be criticised for failure to adequately check for current symptomatology in the never depressed group.

There has also been difficultly in demonstrating mood effects in self-reported endorsements of depressive cognitive styles in non-clinical groups who had a previous vulnerability by virtue of a previous history of depression but show no current dysphoric mood. For example, Lethbridge & Allen (2008) followed up a cohort of vulnerable individuals, and found that cognitive reactivity to the initial mood induction during initial assessment did not predict relapse. The research with previously depressed individuals indicates that a biased cognitive style is only visible under mood stress conditions. The induction of a sad mood seems to facilitate or prime the cognitive style. This observation that mood primes or facilitates the observation of cognitive styles doesn't seem to work for the never-depressed individuals. One of the aims of thesis was to determine whether the cognitive content of autobiographical memory is a trait-like or, conversely, a more state-like manifestation.

The findings reviewed in this section suggest that several aspects of cognitive appraisal in autobiographical memory in vulnerable individuals require further investigation. These will be addressed in the following chapters, and will form the basis for a number of research studies in this thesis. First, it is necessary to examine and review findings in studies investigating naturally occurring dysphoric mood and its effect on autobiographical memory, as it has clearly been demonstrated that autobiographical recall is not a simple mood-dependent epiphenomenon (Raes, Hermans, Williams & Eelen, 2007). Rather, it appears to also be a characteristic of naturally occurring dysphoric mood and of those who have also previously suffered an episode of depression (Raes, Hermans, Williams, Beyers, Brunfaut & Eelen, 2006a).

1.7 Mood state effects in those with naturally occurring depressed mood

Deficits in memory have contributed to our understanding of mood and autobiographical memory, particularly in the case of memory performance in naturally occurring mood disorders such as depression. One of the basic assumptions is that mood biases will be present in every stage of processing

from perception, encoding, attention, storage and recall (Koster, De Raedta, Leyman & De Lissnyder, 2010). The literature on memory and naturally occurring mood disorders such as dysphoria and depression is relevant to researchers who are interested in contributing evidence to the research problem of whether the autobiographical content of naturally occurring disorders is dependent on mood state or related to trait-specific factors. There is also another important issue, which is whether such memory deficits or biases constitute a present vulnerability factor or part of a naturally occurring mood disorder. It was argued by Beck, Rush, Shaw & Emery (1979) that temporary mood changes would have little effect on cognitive biases in the absence of stable dysphoric or depressed symptoms. High levels of dysphoric mood combined with acute negative mood changes might have an increased resonance due to the presence of a relatively stable mild dysphoric mood state e.g. in those showing current dysphoric symptomatology (Miranda & Persons, 1988).

Specific evidence supporting the mood state hypothesis has been reported by Miranda, Persons & Byers (1990). The authors investigated depressed patients' natural variation in mood during the day and reported that dysfunctional thinking increased when mood was worse and decreased when mood was better. Indirect evidence but pertaining to more specific cognitive characteristics has been reported by Teasdale & Dent (1988). The authors assessed the relationship between depression and negative thinking on a number of global negative adjectives used to describe themselves. The findings suggested that depression was significantly and independently predicted by initial level of depression and by the number of global negative adjectives used to describe themselves. Evidence in the literature, to which the review now turns, suggests a number of cognitive sequelae of a stable dysphoric mood.

1.7.1 Depressive symptomatology impacting on autobiographical recall

For clarity, cognitive changes resulting as a consequence of mood state will be termed cognitive sequelae. Also, individuals currently showing depressive symptoms will be referred to as symptomatic or having current symptomatology.

Individuals showing current depressed symptomatology and those with a history of depression are thought to react to negative affect with greater increases in dysfunctional cognitions (Miranda et al., 1998; Miranda & Persons, 1988; Segal, Gemar & Williams, 1999). The current research is interested in contributing to evidence of whether autobiographical content in individuals with symptomatology or history of depression is a factor in their cognitive output. Cognitive sequelae can only be monitored through the content or the processes they generate. Cognitive phenomena, such as thoughts, and various cognitive processes – such as predictions of certainty in future events, preferential processing of negative self-referential information, increased ruminative self focus and susceptibility to resource limitations – have all been reported in those showing current symptomatology, and may be reactive to transitory mood (Oei, Hibbert & O'Brien, 2005).

It has been noted that symptomatic individuals seem to have difficulties in the ability to conceptualize and anticipate future events (Williams, Ellis, Tyers, Healy, Rose & MacLeod, 1996). It has also been suggested by Anderson, Spielman & Bargh (1992) that dysphoric groups are more pessimistic and predict more negative events in the future. The authors suggest that this might be due to the inability to explicitly weigh up the probabilities that a future event will happen. The symptomatic individual will have a spontaneous implicit thought that a negative event will arise, and will be unable to challenge this automatic thought explicitly to discount the unlikely probability it will occur at a particular future date.

The self and autobiographical memory has been an area that has seen an increasing number of research studies. According to Patterson & Seligman (1984), symptomatic individuals get locked into particular attributional styles about how people see themselves and others. These cognitive styles can have a counterproductive effect, not only on the way people see themselves but on the way they relate to other people. Bargh & Tota (1988) conducted an experiment with non-symptomatic and symptomatic individuals under conditions of cognitive load, and found that symptomatic individuals responded with the same response

latencies for depressive and non-depressive self-referential content, while the non-symptomatic showed increased latencies for depressive self-referential content. This suggests that dysphoric individuals have a propensity to automatically process information about themselves which is negatively self-referential. However, for other self-referential content no difference was found between symptomatic and non-symptomatic individuals.

1.7.2 Cognitive load impacting on cognitive content and memory generality

Investigating mood state effects on symptomatic groups and resultant cognitive content is a necessary aspect to the field of memory research, but a clearer understanding of how cognitive load affects memory generality could provide a valuable insight to any mood state effects observed in autobiographical retrieval. Cognitive load is a term that refers to the load on working memory during increased cognitive demands (Baddeley, 1990). The current research is interested in the effects of mood on autobiographical content, because negative mood itself can be seen as a cognitive load which seems to affect a number cognitive processes. According to Williams et al. (2007), reduced cognitive resources result in a number of cognitive sequelae such as increased rumination and reduced overgeneral autobiographical retrieval.

When cognitive resources are under cognitive load there seems to be an increase in ruminative self focus (Raes et al., 2007). A study focusing on the relationship between overgeneral memory and ruminative self focus has been undertaken by Morrow & Nolen-Hoeksema (1990). Overgeneral memory involves focusing on cognitive processes involved in memory retrieval, which implies reduced memory specificity (Raes et al., 2007). The Morrow & Nolen-Hoeksema (1990) study used a negative mood induction procedure with individuals with naturally occurring dysphoric mood and used an experimental procedure to study the effects of rumination by asking them to focus in on their thoughts and feelings. The individuals were then assessed, and it was found that high ruminative self focus correlated with greater negative mood. A second study focusing on the relationship between overgeneral memory and ruminative self

focus was completed by Ciesla & Roberts (2007). The authors randomly assigned participants to either a rumination or distraction procedure following a sad mood induction. The study found that rumination was more strongly associated in those showing depressive symptoms. The depressive symptom group also reported higher levels of negative cognitions post mood induction. It has been observed by Lyubomirsky & Nolen-Hoeksema (1993) that experimental instruction to rumination about thoughts and feelings has not been found to induce negative mood in non-symptomatic individuals suggesting that negative mood state is a necessary prerequisite.

Memory retrieval in non dysphoric groups has been another research area with preliminary findings indicating that the autobiographical memory retrieval process could be susceptible to resources limitation or so-called cognitive load (Goddard, Dritschel & Burton, 1998). The research involved a time study which participants completed whist undergoing a dual task design to tax ‘mental capacity’ under experimental conditions. The finding indicated that high cognitive load produced more overgeneral recall in participants. The finding could indicate that when ‘mental capacity’ becomes taxed during cognitive load, this leads to greater reliance on implicit or automatic cognitive processes. Wegner (1994) argues these processes are seen in dysphoric individuals who are distracted by rumination and thus seem unable to challenge negative cognitive styles which non-dysphoric individuals otherwise might.

The previous findings of pessimistic content in recall and individuals predicting more negative events in the future when in depressive state, increased negativity of thoughts about events, increased ruminative self focus and increase in memories that lack time, place and person detail, or so-called overgeneral memories, are of interest to researchers examining mood state effects on autobiographical recall because these factors could be important outcome factors that affect retrieval during negative mood state.

1.8 Studies involving overgeneral memory as a cognitive characteristic

The literature on mood and overgeneral memory in naturally occurring mood disorders such as depression is relevant to the current research, as the researcher is interested in contributing evidence to the research problem of whether autobiographical memory retrieval in symptomatic or vulnerable people is dependent on mood state or related to trait-specific factors. Overgeneral memory seems not to be a simple mood-dependent epiphenomenon of depression but a trait characteristic of the depressed and formerly depressed (Raes et al., 2007).

The phenomenon of overgeneral memory has been investigated predominantly in those already showing signs of depression compared to primed studies which predominantly utilise non-depressed individuals. Studies involving memory specificity have involved participants showing signs of depression, but very little is known about those individuals with a previous episode of depression but currently showing no signs of symptomatology. Overgeneral memory as a cognitive characteristic will be discussed in this section, as it is a characteristic affected by some components of mood especially arousal (McBride & Cappeliez, 2004). Overgeneral memory represents a cognitive process which focuses on how information is encoded, altered, combined and stored in memory rather than focusing on shifts in attention, rumination, self-evaluation and future predictions.

1.8.1 Mood effects on overgeneral memory in the symptomatic

The literature on depressive symptomatology and overgeneral memory is relevant to the current research as the researcher is interested in contributing evidence to the research problem of whether pre-existing symptomatology is a moderator in the effects of mood on autobiographical memory retrieval. The effects of pre-standing mood on memory was first highlighted by Williams and Scott (1988), who observed that patients with depressed mood have a tendency to be ‘over general’ in recalling autobiographical events. The non-depressed were able to recall more specific memories in response to positive cue words than depressed individuals, who recall significantly more general memories. They

concluded that patients had a longer delay in recalling positive memories because of the non-congruent mood between the current mood states and the memory to be recalled. It was further suggested that there might be a tendency to recall less specific positive events compared to specific negative events.

Barnard, Watkins & Ramponi (2006) investigated non-symptomatic participants who were not prone to excessive levels of rumination. The participants were asked to retrieve autobiographical memories with variants of an animal-related category fluency task. The findings indicate that self-focused rumination on the material had no effect on reducing specific recollection in the non-dysphoric. In a second study, Barnard et al. (2006) investigated rumination of self-related material. The results indicated that the self-related material had the effect of reducing specific recollection in the non-dysphoric.

Researchers have also focused their attention on the mechanisms underlying overgeneral memory. For example, Maccallum, McConkey, Bryant & Barnier (2000) investigated the impact of hypnotically induced mood on the specificity of autobiographical memory in a non-dysphoric group. Participants were asked to retrieve specific autobiographical memories in response to positive and negative cue words. When in a sad mood induced condition, participants provided fewer specific memories in response to positive rather than negative cues. Findings suggest that impaired recall of specific memories may be mediated by state factors associated with sad mood. It could be argued that the study did have a number of methodological weaknesses, such as not controlling for previous history of depression, not testing the relationship between autobiographical memory specificity to current emotional state, and using only highly hypnotisable subjects.

Research also indicates that the ‘overgeneral’ memory could be a stable trait that is relatively unaffected by mood state (Williams, 1996; Williams & Dritschell, 1988). Williams & Dritschell (1988) investigated differences in those who were currently suicidal and those who had been but were currently not suicidal, and

found that both groups had fewer specific autobiographical memories than a control group. Similarly, research such as Brittlebank, Scott, Williams & Ferrier (1993) found no differences in those who were depressed and those who were in remission and their overgeneral memories. Equivocal evidence was also demonstrated in an investigation by Kuyken & Dalgleish (1995), which involved a post hoc review of participants who were vulnerable to depression by virtue of previous episodes and participants with no previous episodes. The findings suggested that there were no differences in overgeneral memory between the vulnerable and non-vulnerable groups. It is important to note that the Kuyken and Dalgleish study was in the absence of current low mood state.

1.8.2 Mood effects on overgeneral memory in the vulnerable

Overgeneral memory has been shown to be persistent in those recovered from depression (Raes, Watkins, Williams & Hermans, 2008). Formerly depressed and currently depressed have been found to have higher levels of overgeneral memory compared to never depressed individuals (Mackinger, Pachinger, Leibetseder & Fartacek, 2000). The current research is interested in contributing to evidence of whether overgeneral autobiographical memory represents a trait or state dependent phenomena. There has been some difficulty in finding overgeneral memory within non-clinical groups showing previous vulnerability by virtue of a previous history of depression (Raes et al., 2008).

Lang, Bradley & Cuthbert (1997) argued that valence reflects the degree to which a stimulus is negative or positive, and arousal reflects the intensity of the stimulus. The current research is interested in contributing to evidence of whether valence and arousal levels are important mood-related variables on cognitive sequelae in autobiographical memory. McBride & Cappeliez (2004) designed a study to investigate the effects of manipulating valence and arousal components of mood on specificity of autobiographical memory. In their first study, no difference was found in autobiographical memory specificity among formerly depressed and never-depressed subjects. In a second study by McBride & Cappeliez (2004), exercise was used as a way to prime low and high arousal

mood states. The authors then investigated the effects of manipulating valence and arousal components on specificity of autobiographical memory. Their results indicated that low arousal state evoked an increased proportion of overgeneral memories. The authors suggest that this memory phenomenon may be influenced by the arousal component of mood.

The effects of primed states have been investigated with both positive and negative mood affects. Svaldi & Mackinger (2003 & 2004) investigated recall of autobiographical mood congruent memories with recovered depressed and never-depressed people. The results indicate that a positive mood induction leads to a mood congruent increase of specificity, while negative mood induction leads to a mood incongruent decrease of specificity. There are equivocal findings of the effects of positive and negative effects on memory specificity. Yeung et al. (2006) investigated whether reduced autobiographical memory specificity (AMS) could be induced in healthy volunteers with no history of depression, using a negative mood manipulation. Results showed a reduction in AMS following negative mood induction, compared to a neutral induction, whereas positive mood induction had no effect on AMS. The effect of experimentally induced retrieval style seems to impact on judgements of negative experience (Raes, Hermans, Williams & Eelen, 2006b). The authors investigated students who habitually retrieve less specific memories and found that participants who were induced to retrieve memories in an overgeneral way experienced more distress following a negative event than participants who were induced to retrieve memories in a specific way.

Overgeneral memories could have more state like components than previously thought, and could possibility be modifiable by manipulation of mood state conditions. Williams, Teasdale, Segal & Soulsby (2000) suggest that the mindfulness-based cognitive intervention helps reduce overgeneral autobiographical memories in those recovered from depression in the former research and in those currently depressed in the latter research compared to control groups. Research suggests that there might be clinical efficacy in

targeting some of the deficiencies seen in those vulnerable to depression. It has been suggested that overgeneral memory is based upon defective retrieval strategy which abandons the recall before it reaches the knowledge base of specific memories. The premature abandonment is likely to produce a memory that is not only overgeneral but less vivid and clear (Coluccia, Bianco & Brandimonte, 2006). The overgeneral memory bias is thought to be related to a number of cognitive characteristics seen in vulnerable individuals and to have consequences for maintaining and exacerbation of affective state (Barnard et al., 2006; Yeung et al., 2006). Overgeneral phenomenon is thought to be linked to the poor problem-solving skills which have been observed in symptomatic patients and possibly also in those vulnerable to depression (Evans, William, O'Loughlin & Howells, 1992). It is argued that if those who are symptomatic or have a vulnerability to depression have difficulty in producing specific memories and take longer to produce these memories, they will be at a disadvantage when it comes to using such techniques in everyday problem-solving (Williams, 1996). The proposition that autobiographical memories in low mood states might lack specificity in the symptomatic and vulnerable is likely to be of interest to researchers examining the effects of primed negative mood state on memory recall.

1.9 Summary and aims

The literature on naturally occurring mood suggests that individuals suffering from depression have difficulty in retrieving specific memories and instead retrieve summarised schematics or overgeneral memory. A recent meta-analysis reinforces this robust finding (van Vreeswijk & de Wilde, 2004). The literature further suggests that biases in cognitive functioning, e.g. increased negativity and increased worries about the self, appear in addition to overgeneral memory in depression (Miranda et al., 1998). There are unanswered questions about the cause of the observed findings due to negative mood or depressive symptomatology. The cognitive biases in naturally occurring mood could stem from the co occurring concomitants of depression rather than negative mood state *per se*. The literature review indicates that the strongest evidence for

changes in cognitive functioning and overgeneral memory occurs in individuals with a current depressive symptomatology for a mood state dependent process.

Priming studies which in the main have focused on vulnerable but currently in remission or non-vulnerable individuals suggest that negative primed mood induces biases in cognitive functioning on self-reported measures in vulnerable individuals but not non-vulnerable. Similar but less equivocal findings in overgeneral memory indicate that induced mood produces overgeneral memory in the vulnerable but is absent or less pronounced in the non-vulnerable. The strongest evidence in the literature comes from self-reported questionnaires that measure cognitive products, but there is further evidence from performance-based measures. Studies assessing attentional functioning via Stroop tests (Golden, 1978) have been equivocal, but dichotic listening tasks have been less equivocal in demonstrating cognitive reactivity.

Despite the growing evidence in both naturally occurring mood studies and mood priming studies indicating the occurrence of cognitive biases and overgeneral memory, there are a number of studies showing negative findings. This may be due to lack of consistency of measures employed in studies to assess cognitive functioning. Research in both naturally occurring mood and priming studies have concentrated on cognitive products rather processes or structures. The nomenclature of the different cognitive levels is important because cognitive theory suggests changes in cognitive products will occur with remission of depression or negative mood because of their reactivity to mood state, but cognitive processes and structures are seen as more enduring predispositions that may be less reactive to mood state (Segal, 1988). The negative findings are further complicated by the lack of consistency in criteria of depressive symptomatology which vary between studies. It is clear that a single study looking at different groups based on a single criterion on identical tasks may be more informative than cross study comparisons. Additionally, the tasks need to focus on wider cognitive functioning rather than single measures and include

memory and cognitive functions. Furthermore, the role of mood state in producing the biases in memory and cognitive functioning is not well understood.

The general aim in the present research is to expand standard frameworks on autobiographical memory, which predominantly examine specificity of the memory, towards examining the content and the appraisal within the autobiographical memory. The research intends to examine the reactivity of autobiographical content and appraisals to negative mood components, thereby expanding traditional frameworks within autobiographical memory. The present research also intends to examine autobiographical memory in conjunction with a traditional framework of memory in terms of specificity when in negative mood state. Both the reactivity of autobiographical appraisals and the categorical approaches taken is intended to extend the literature on mood state effects within autobiographical memory by comprising both reactivity and specificity of memory in a series of studies.

The present research program intends to investigate the effects of negative mood in retrieval of autobiographical content. The effects of naturally occurring low mood on autobiographical memory has been found to increase overgeneral memory. It is thought that overgeneral memory could be a mechanism related to a decrease in sensory and affective detail as well as cognitive content in autobiographical memory. In the first instance, the present research is interested in establishing whether a link exists between negative mood and autobiographical retrieval, initially by examining the sensory and affective information contained in autobiographical memory, and then by examining how cognitive content retrieval is effected by negative mood. The research intends to examine the effects of pre-existing symptomatology and vulnerability to depressed mood which might be linked to changes in autobiographical retrieval. Finally, it will consider the importance of negative mood effects on self-focused retrieval – a hypothesised factor related to autobiographical memory recall which may influence autobiographical content and generality of memory. The research is interested in the relationships that exist between mood and autobiographical

memories, and wants to investigate the above predictions deduced from the literature against the data from the present research. It seems that mood affects autobiographical memory in complex ways, sometimes interacting with several variables at any one time.

The literature reviewed in this chapter suggests that several aspects of autobiographical recall in negative mood require further investigation. The literature reviewed in this section highlights negative mood may be related to autobiographical memory retrieval patterns. The purpose of this program of research is to investigate the role of negative mood in the retrieval of both autobiographical content and generality of memory. Initially, the role of negative mood in autobiographical retrieval has to be established.

CHAPTER 2

STUDY 1: Autobiographical memory responsiveness to an induced negative mood state: Sensory and emotional appraisals in students.

2.1 Introduction

As a first step in assessing the role of mood in the retrieval of autobiographical memories, the first study of this research investigated whether change in mood effects change in sensory and emotional aspects of autobiographical memory retrieval.

2.1.1 Theoretical background

There is a weight of evidence that suggests that negative mood is associated with bias in cognition styles and difficulty in retrieving specific autobiographical memories (Sumner et al., 2010). Mood effects have been examined by inducing the intended state using a variety of mood induction procedures (see section 1.4.2 in literature review). Park & Bannaji (2000), for instance, investigated the effects of mood on shifts in processing style and judgement appraisal. The study utilised a video to induce intended mood state and measured the effect on sensitivity and bias in judgements. They found negative mood increased sensitivity to the information presented while also showing a corresponding decrease in errors in judgement. The authors concluded that negative mood state encourages more intensive cognitive based and effortful processing.

Other studies have reported an effect of mood on biases in memory (see section 1.7.1 in literature review). The empirical evidence of the effects of negative mood state on memory has come from primed mood studies and research into naturally occurring mood states (see section 1.6 and 1.7 in literature review). Importantly for this study, which utilised non-clinically diagnosed subjects, evidence has come from non-depressed individuals with no reported history of depression (Barnard et al., 2006; Yeung et al., 2006). The mood induction experiments with

non- and never-depressed support the observation of reduced autobiographical memory specificity when in negative mood states.

Previous empirical studies provide important insights into how mood may change certain variables in autobiographical memory. Firstly, there is strong evidence that mood may decrease one's ability to recall vivid memories rich in sensory detail (Coluccia et al., 2006). Autobiographical memories of events are typically rich in cues to their external perceptual origin, containing content high in colours, perceptual clarity and vividness (sensory properties), and contextual information such as relative spatial location and temporal order (Conway, 1990). Second, there appears to be evidence that personal importance of a memory is influenced by negative mood by raising the potential that negative memories about events have greater personal significance (Williams et al., 2008). Third, negative mood seems to increase the likelihood of emotional intensity of the autobiographical memory. Individuals often remember more emotional events than non-emotional ones when in negative mood (Tsai, Loftu & Polage 2000). Fourth, there is evidence to suggest that negative mood influences the potential increase in retrieval of similarly valenced memories. Walker, Skowronski, Gibbons, Vogl & Thompson (2003) suggest that the mood of the individual at the time of recall, rather than at the time of encoding, has a stronger effect on valence of autobiographical memories. Finally, there is evidence that autobiographical memories are recalled disproportionately for a certain lifetime period between the ages of 10 and 30 (Schroots, Van Dijkum & Assink, 2004). The influence of negative mood on autobiographical memory and its effect on recall for recent or past events is less certain but is a variable that has appeared in a number of autobiographical studies (Berntsen & Rubin, 2002; Piolino, Desranges, Benali & Eustache, 2002).

Unresolved issues for this study appear to be what specific negative mood dimensions are responsible for the differences in autobiographical memory retrieval observed in negative mood states. The measurement of mood has concentrated on administered scales that measure single dimension of mood,

such as degree of sadness or negative effect, or two-dimensional concepts in which concepts such as valence and arousal are considered in the analysis. Valence looks at the positive versus negative (e.g. happiness, sadness) dimension, while arousal looks at active versus de-active (e.g. alert, sluggish) dimension in certain emotional states. The University of Wales Institute of Science and Technology Mood Adjective Checklist (the UWIST-MACL; Matthews et al., 1990) measures two common arousal scales: energetic arousal (EA), which pertains to how active or inactive the individual is in the emotion, and tense arousal (TA), which pertains to how tense or relaxed the individual is in that emotion. The UWIST-MACL has a third valence dimension, hedonic tone (HT), which measures contentment vs. discontentment in the emotional state. The UWIST-MACL does also include an additional frustration scale, which tends to be closely aligned with hedonic tone (Matthews et al., 1990).

The UWIST-MACL (Matthews et al., 1990) three-dimensional model of mood enables a clear description of affective states. The dimension of HT allows focus on affective tone separately from EA, which is associated with psychomotor activities, and TA, which is associated with somatic symptoms and perceived distress. The ability to be able to measure separate aspects of negative mood state is important in the content of this research as it enables the analysis of precise aspects of negative mood with its effects on specific autobiographical variables.

2.1.2 Autobiographical memory cueing technique

The cue word technique has been used in priming studies, whereby participants are provided with a neutral cue word and asked to produce an associated memory from their past. The cued memory technique was originally used by Galton (Galton, 1883), and employed more recently by Williams & Broadbent (1986), who modified the technique for cueing autobiographical memories. Its strength lies in its simplicity, and the technique allows for the minimum of intervention and instruction from the researcher. In the literature there are a number of studies which have used the cue word technique to cue

autobiographical events (Barnard et al., 2006; Maccallum et al., 2000; McBride & Cappeliez, 2004; Yeung et al., 2006; Raes et al 2006b; Svaldi & Mackinger, 2003 & 2004). Despite the large number of studies in literature purporting to its simplicity (Conway 1990; Conway & Rubin, 1993; Crovitz & Schiffman, 1974; Williams & Broadbent, 1986), the technique has not been without its critics due to its reliance on single words used out of context (Baddeley & Wilson, 1986). In real life, memory recall would be evoked by contextual content from the event or by an aspect of the event that was similar to the related memory.

Cued autobiographical memory has emerged as an interesting measure (Watkins, Martin & Stern, 2000b). This technique also has the effect of reducing the possible bias inherent in active techniques that tend to manipulate the 'to-be-remembered' memories. The technique involves cueing memories by a modified version of the paradigm used by Williams & Broadbent (1986), in which words are provided with minimal prompts as memory cues. This has remained the main technique for cueing autobiographical memories. Its strength lies in its implicit and automatic nature of the technique. Macaulay, Ryan & Eich (1993) found mood effects to be more observable when assessed via implicit and automatic rather than explicit and non automatic memory measures. Implicit memory is 'without conscious awareness' and automatic, thus has limited impact on working memory processing resources. In summary, there has been a move away from the use of explicit self-reporting questionnaires to assessments of more self-referent implicit autobiographical memories (Watkins et al., 2000b).

In summary, there are criticisms of a number of measures that report to measure autobiographical content. The terms 'content' and 'appraisal' have been used in the present research. The content can be defined as either external detail or an appraisal of the detail in the recalled memory (Bokhari, 2011). External detail includes time, place and person. The appraisal of the detail in the memory includes all internal content in terms of subjective interpretations of the external event such as emotionality and vividness (Johnson, Foley, Suengas & Raye, 1988). These criticisms revolve round the sensitivity to the different hierarchical

levels and explicit nature of the techniques, which may be trying to measure implicitly that which cannot be captured by such means. It is therefore argued that implicit measures may capture a different dimension of cognitive events. There is consensus that autobiographical memories are comprised of a sense of self in the past and contain a high degree of sensory-perceptual details (Williams et al., 2008).

2.1.3 Purpose of the study

The study to an extent is exploratory, because there is some evidence on the effects of depressed mood, but less evidence on the effects of individual negative mood components on autobiographical retrieval. This study sought to understand the effect of negative mood on autobiographical retrieval. The aim of the present study is to evoke autobiographical memories by asking participants to rate each memory event for a number of characteristics on an analogue scale. The characteristics were: vividness, personal importance, emotionality, valence and recency. Researchers interested in autobiographical memory and associated retrieval typically used single items or items pools which contain single items on a dimension related to the construct to assess memory (Sutin & Robins, 2007). The construction of item pools to assess the most dominant dimensions of autobiographical memory has been endorsed by previous researchers (Sutin & Robins, 2007). The present study identified the dominant characteristics in autobiographical memory and constructed a single item question to assess the dimensions and mapped onto questionnaires assessing the phenomena (Table 1b on the next page).

Table 1b: Single item dimensions and mapping with questionnaires for present study

Construct	Question on questionnaire	Mapping to Literature
Vividness	How clearly can you remember the event?	Memory Characteristic Questionnaire (MCQ; Johnson, Foley, Suengas & Raye, 1988)
Personally important	How personally important was this event?	Autobiographical Memories Questionnaire (AMQ; Rubin, Schrauf & Greenberg, 2003)
Emotionality	How emotional was the event?	Memory Characteristic Questionnaire (MCQ; Johnson, Foley, Suengas & Raye, 1988)
Valence	How positive or negative was this emotionality?	Memory Experience Questionnsire (MEQ; Sutin & Robins, 2007)
Recency	Approximately how long ago did the event happen (in years)?	Autobiographical Memories Questionnaire (AMQ; Rubin, Schrauf & Greenberg, 2003)

For example, the single item “How clearly can you remember the event?” was mapped with the Memory Characteristic Questionnaire (MCQ; Johnson et al., 1988) which measures sensory dimensons. The vividness item in the present study refers to the visual clarity and visual intensity of the autobiographical memory and can be seen as sensory in that it aims to measure the visual sense over and above other sensory/perceptual aspects that are re-experienced during autobiographical retrieval (Sutin & Robins, 2007). Sensory/perceptual aspects were encompassed within a vividness measure (e.g., vividness of such things as sound, colour), while contextual information was encompassed within a recency measure within the present study. Contextual information category could also contain spatial and temporal attributes. Lastly, affective information was measured by utilising emotionality, personal importance and valence measures. These five characteristics represented three key components of autobiographical memory and represent the key areas in the literature (Johnson, Foly, Suengus & Raye, 1988; Williams et al., 2008).

The validity of the mood induction procedure was verified by a manipulation check. This was done to observe that the negative mood induction technique was changing the individual mood components as measured by the UWIST-MACL (Mathews et al., 1990). To address the general aim of how mood affects autobiographical retrieval, participants rated a number of characteristics, which the individual endorsed on an analogue scale. Secondly, the endorsements were observed pre and post mood induction and observed against four dimensions of negative mood as measured by the UWIST-MACL (Matthews et al., 1990). The general aim was propagated in response to the lack of research investigating how mood affects the sensory and affective information held within autobiographical memories.

As attested by the studies within this chapter, the dimensions of vividness, personal importance, emotionality, valence and recency seem important attributes of autobiographical memories, yet there appears to be little research available to demonstrate how these variables are influenced by negative mood. A key question for this study is what specific negative mood dimension could be responsible for the differences in autobiographical memory retrieval observed in negative mood states. The present research project focuses on the effect of mood change and the resultant changes in the content in autobiographical memories. This was achieved by looking at sensory and affective information attached to memories rather than the cognitive content of memories *per se*.

The present study employed a non-clinical sample to examine the effects of negative mood on autobiographical memory irrespective of any psychopathology. A sample of students underwent autobiographical memory tests focusing on the memory appraisal prior to and following a negative mood induction procedure. The mood induction procedure is intended to induce a negative mood, which in some individuals could generate increased general level retrieval (i.e. an overgeneral memory) according to the literature (van Vreeswijk & de Wilde, 2004). This may paradoxically reduce the information retrievable from memory because of the effects of mood on memory. The sensory and affective

information held within the event memory is likely to be limited due to the reduced recall of 'event-specific memories' where there is likely to be higher sensory and effective information (Williams et al., 2007).

The literature discussed in this chapter indicated that negative mood has an effect on autobiographical memory which appears to be generally consistent with the predictions for the five characteristics; increase in negative mood could show a change in vividness and personal importance, recency, emotionality and valence. Interestingly, because of the paradoxical effect of negative mood on increasing overgeneral memories, it is possible that all outcome autobiographical sensory and affective measures may be positively associated with mood. However, the exact dimensions of mood have gone unspecified and unreported. Accordingly, the present research investigates the effect of the different dimensions of mood, as measured by the UWIST-MACL, on both content-based attributes and memory changes on the free recall of autobiographical memories.

In summary, there are a number of possible influences of negative mood state on recall; it is thought that vividness, emotionality and personal importance are influenced by mood state; recalling positive or negatively valenced personal experiences can maintain undesirable moods or alter sensory and emotional memories. The characteristics of autobiographical memory highlighted have emerged from research and opened up further questions on the effects of negative mood on sensory and emotional endorsements when recalling autobiographical content.

$H_{1.1}$ Research suggests that negative mood causes a change in vividness for similarly affected autobiographical events (Coluccia et al., 2006). It was hypothesised that negative mood would cause a change from pre to post mood induction on endorsements of vividness in the cued autobiographical event. A change in vividness, with its sensory and perceptual aspects, could possibly suggest a change in access to event-specific memories.

$H_{1.2}$ Research suggests that negative mood causes a change in personal importance because negative memories about events have greater personal significance (Dalgleish, Spinks, Yiend & Kuyken, 2001; Isen et al., 1978; Teasdale, Taylor & Fogarty, 1980; Williams et al., 2008). It was hypothesised that negative mood would cause a change from pre to post mood induction on endorsements of personal importance in the cued autobiographical event. The possible change in personal importance, with its emotional aspects, could suggest a change in access to event-specific memories.

$H_{1.3}$ Recent research suggests that negative mood causes a change in emotional intensity of an event other than its positivity or negativity (Tsai et al., 2000). The change in emotional intensity as an emotional aspect could possibly suggest a change in access to event-specific memories. It was hypothesised that negative mood would cause a change from pre to post mood induction on endorsements of emotionality in the cued autobiographical event.

$H_{1.4}$ Research suggests that negative mood causes a change in positivity or negativity of autobiographical recall (Williams et al., 2008). It was hypothesised that negative mood would cause a change from pre to post mood induction on endorsements of positivity or negativity in the cued autobiographical event.

$H_{1.5}$ It was hypothesised that negative mood would cause a change from pre to post mood induction on endorsements in how recent an event occurred in memory (Schroots et al., 2004).

2.2 Method

2.2.1 Participants

Forty-four students from the University of Chester's Faculty of Health and Social Care participated in the study. The mean age of the sample was 29.52 years, standard deviation 9.05 with a range of 19-49 years. The sample consisted of 36 female (81.82%) and 8 male (18.18%) participants. 4 participants were excluded for their own protection on the basis of their high BDI-2 score (see section 2.2.3 for ethical procedure and support offered to all participants). A power calculation was conducted on GPOWER, a general power analysis program (Erdfelder, Faul & Buchner, 1996). A sample size of 44, with alpha level set at $p = 0.05$, and a large effect size ($r = 0.5$), gives 98% power to detect real differences due to treatment effects, rather than chance. Informed written consent was obtained from all participants. All participants were treated within code of ethics and conduct guidelines by the British Psychological Society (BPS; 2009). The consent form, information sheets and research approval form constitute Appendices 1, 2 and 3, respectively.

2.2.2 Materials and measures

The Beck Depression Inventory (BDI) – Version 2 (Beck, Steer & Brown, 1996) was used to measure participants' level of depressive symptoms on a 0-3 Likert scale, with higher numbers corresponding to more severe symptoms (Appendix 4). The 21- item, self-reported questionnaire assesses symptoms present within the past two weeks. Scores range from 0 to 63. The BDI is a widely used self-report inventory of depressive symptoms with good internal consistency and test retest reliability (Beck, Steer & Garbin, 1988). It has been shown to correlate highly with psychiatric ratings of depression (Bumberry, Oliver & McClure, 1978).

The University of Wales Institute of Science and Technology Mood Adjective Checklist (UWIST-MACL) was used to measure participants' level of mood (Matthews et al., 1990). The measure consists of a 29-adjective checklist containing four factorial scales of hedonic tone (HT), tense arousal (TA), energetic arousal (EA), and anger/frustration (AF). Scores on the hedonic tone

and energetic arousal scale are negatively related to the level of negative mood (low-scaled scores represent greater negative mood), whereas higher values reflect a greater negative mood on tense arousal and anger/frustration scales (Appendix 5). The psychometric properties were identified for the UWIST-MACL and shown to have good internal reliability and validity for non-clinical mood variations (Matthews et al., 1990).

The autobiographical memory cuing technique as used by Williams & Broadbent (1986) was modified to assess autobiographical content on presentation of words as memory cues. The modified version of the Autobiographical Memory Test (AMT; Williams & Broadbent, 1986) has been widely used to assess autobiographical content and has been found to have good reliability (Williams et al., 2007). Participants were asked to rate each of the four memories triggered by the four natural cue words on a 7-point Likert scale (ranging from 1 to 7). The participants rated their cued memories on vividness, recency, personal importance, emotionality and valence (see Table 2 and Appendix 6).

Table 2: List of predictor and outcome variables

Independent/Predictor/Explanatory Variable (s)	Dependent/Outcome Variable (s)
The University of Wales Institute of Science and Technology Mood Adjective Checklist (UWIST-MACL)	*Cued Autobiographical Memories (CAMQ)*
	Vividness
	Personally important
Energetic Arousal (EA)	Emotionality
Tense Arousal (TA)	Valence
Hedonic Tone (HT)	Recency
Anger/frustration (AF)	

2.2.3 Procedure

Following written informed consent (see Appendix 1), participants completed the BDI-2 (Beck et al., 1996), which was used as a screening questionnaire to assess the level of depressive symptoms and screen out moderate to severely depressed students for their protection. Participants scoring 13 or above on the BDI were excluded from the study for their protection, while those who scored 1-12 were asked to participate in the procedure. The procedure allowed for confidentiality as well as disclosure of the risks and benefits. The participant information sheet indicated that “Some questions you will answer are about signs of depression. If your answers show you may be helped by an evaluation for depression, we will let you know and suggest that you talk with your health care provider about an evaluation” (see Appendix 2 for Participant Information Sheet). The present procedure was adapted from Clark, Deaton & Dunbar (2003) and Stanton & New (1988) ethical procedures when using screening measures for depressive symptoms. The BDI–2 (Beck et al., 1996) was scored by the researcher following the consent and before the invitation for the research procedure was provided. The students were given the invitation following the break and given a time during the same day. This procedure ensured confidentiality and ensured that other students could not identify those students that had been excluded compared to those who did not consent or those that had just been offered a different time. The protocol identified and screened for positive responses to the suicidal and pessimism items and high scorers on the BDI-2 psychometric measure. An academic member of staff and a health professional advised on further evaluation as appropriate. The researcher offered and provided a debriefing session. The debriefing session allowed participants to ask questions and provided written information on how they may contact the student Counsellor due to any remaining concerns about depression.

At time point 1, the participants were then asked to complete the Mood Adjective Checklist psychometric measure (the UWIST-MACL; Matthews et al., 1990). The mood measure provided the baseline mood scores for the study and was used as a mood predictor variable. The subjects were then given the following

instructions, according to the instructions for the administration of the UWIST-MACL (Matthews et al., 1990). The experimenter read out the following passage which was written on each questionnaire for the participants: "You will be given a list of words which describe the moods or feelings which people have. To complete the checklist, you should indicate how well the word describes how you feel at the moment (and not just how you usually feel). You must choose one of four possible replies – 'definitely', 'slightly', 'slightly not', and 'definitely not'. These choices are numbered from 1 ('definitely') to 4 ('definitely not') respectively. Simply circle the number which corresponds to the reply that best describes your present mood."

Following completion of psychometric measures, participants were administered the Cued Autobiographical Memory Questionnaire. Participants were instructed to report the first specific personal memory triggered by each stimulus word and write down as much detail as necessary (see Appendix 6 for instructions). The four cue words from list A were 'bike', 'tree', 'shed' and 'supermarket' and list B were 'car', 'flower', 'garage', 'shop' (see Appendix 8a for cue words and instructions). The experimenter read each word as it was displayed on the PowerPoint projector. Following the four cue words, the participants were given a scoring sheet to rate certain characteristics of each memory on a 7-point Likert scale. Participants rated a number of characteristics of memory such as: how recent, how emotional, how personally important and how vivid.

Between time points 1 and 2 was the intervention phase, which involved the group undergoing the Velten Mood Induction Procedure (Velten, 1968). This procedure involves participants reading a list of 60 graduated depressogenic self-referent statements (Appendix 7a). The participants were asked to read each word, which is shown for approximately 10 seconds by a PowerPoint projector viewed on a white screen. The current research project administered the Velten technique to small groups of approximately 20-30 participants. There has been a number of studies reporting group Velten procedures (Baker & Guttfreund, 1993; Bates et al., 1999; Sinclair et al., 1994). The findings suggest a number of

advantages to group administration. For instance, it is more homogenous than individual administration and has the benefit of collecting a large amount of data in the minimum time period (Bates et al., 1999).

At time point 2, the same participant group was administered the Mood Adjective Checklist measure, the cued autobiographical memory task (word lists A & B were used in rotation with each group; see Appendix 8a & b). The reverse Velten Mood Induction Procedure (Appendix 7b) was used to raise the mood of participants before leaving the experiment and prior to questions and answers. This was followed by a debriefing session (BPS, 2009).

2.2.4 Design and analysis strategies

The experiment had a within-subjects design. The predictor or independent variable was mood induction procedure with its effect on individual's mood, which was measured by the mood adjective checklist and its four sub-scales: energetic arousal (EA), tense arousal (TA), hedonic tone (HT) and anger/frustration (A/F) (Matthews et al., 1990). The within-subjects design enabled an assumption of equivalence with respect to individual difference since the participants were the same in each condition. The dependent measure was the autobiographical output which was measured by the Cued Autobiographical Memory Questionnaire (CAMQ) and its five endorsements. For the purpose of the present research, the researcher will refer to the independent measures as the predictors and the dependent variables as the outcome measures. The Statistical Package for the Social Sciences was used for the analysis. The predictor and outcome variables were defined and are listed in Table 2 (see p.40).

The hypotheses concerning mood effects on autobiographical memory retrieval formulated in section 2.13 were tested by evaluation of change scores from pre to post mood induction (i.e. comparison of change score means).Change score analysis, rather than a factorial ANOVA (analysis of variance), was chosen for two main reasons. First, change scores have a certain logic and intuitive appeal when measuring change in individuals and identifying factors which predict or

explain change (Locker, 1998; Shahar, 2009; Singer & Willett, 2003). This has been used most notably in clinical pre and post health and behavioural status measures (Gawrysiak, Nicholas & Hopko, 2009; Karcher, 2005; Miranda, Fontes & Marroquin, 2008). Second, the use of mean change scores reduced the number of independent statistical tests and thus limited type I errors (Shahar, 2009; Singer & Willett, 2003). A five factorial ANOVA could have increased the number of independent statistical tests to 20, increasing the possibility of type I errors.

Therefore, analysis of change scores was considered advantageous. The present research used simple change scores because individual response to mood manipulation can be variable, with mood components and numbers responding to individual mood components changing from pre-test to post-test, making the use of residuals as a measure of change less accurate (Karcher, 2005). Analysis of change scores (post-test – pre-test) assists in analysing the change of two or more outcome variables over a particular treatment or manipulation (McFarland & Ryan, 2006; Shahar, 2009; Westaby, Saatvedt, White, Katsumata, van Oeveren & Halligan, 2001). The difference between two scores allows for an investigation of the relationships in outcome variables between two time points (McFarland & Ryan, 2006; Rogosa, Brandt & Zimowski, 1982; Shahar, 2009; Westaby et al., 2001). In the present research, mood change was calculated by subtracting pre-test scores from post-test scores for all participants. The characteristic of cognitive change (post-test – pre-test) can then be correlated with the precise aspect of mood change (post-test – pre-test) as measured by the UWIST-MACL.

The first stage of analysis involved the completion of the pre and post scores on the UWIST-MACL and CAMQ. The recorded participant number allowed matching for pre and post scores for each participant. The students t-test was performed on the mean scores to test for statistical significance. Normality was determined using the Kolmogorov-Smirnov test. The second stage of analysis involved the mean and standard deviations being calculated for each cued

autobiographical memory measure at pre and post mood induction. The relationships of interest is change scores between time 1 and time 2 (pre and post mood induction), so the differences between measurements was used for the analysis. Similarly, test scores at baseline (cued autobiographical memory measures 1) and test scores after mood induction (cued autobiographical memory measures 2) were completed. Secondly, change scores were calculated as change within treatments (post minus pre mean scores). The change in mood (post mood 2 minus pre mood 1) and the changes in test scores (cued autobiographical memory measures 2 minus cued autobiographical memory autobiographical measures 1) were compared using two-tailed bivariate correlations. A p-value < 0.05 was considered statistically significant.

The individual variability of mood induction could increase the existence of small changes being recorded, and therefore could result in limited detection of relationships being observed. Probability values and effect sizes were used to combat individual differences involved in mood induction and limited range on the UWIST-MACL measure. For example, p-value < 0.05 would indicate statistical significance, and effect sizes were completed and used in the analysis of the results to combat error. Significant tests were two-tailed rather than one-tailed, as the present research was interested in the relationship between mood and effect on cued autobiographical memory measures. The effect of negative mood on autobiographical content has been reported but the effect of individual mood components on autobiographical memory is less evident in the literature. It is noted that a two tailed test might give less power but the uncertainty about the direction of the relationship, exploratory nature and considering the consequences of missing an effect in the other direction, a two tailed test was considered necessary. Therefore, the present research hypotheses did not predict the exact directional relationship but rather that a relationship does exist.

2.3 Results

2.3.1 Descriptive statistics

Cued Autobiographical Memory Questionnaire (CAMQ; modified version AMT by Williams & Broadbent, 1986) was used to obtain means on vividness, personal importance, emotionality and recency of memories. Table 3 presents the mean and standard deviation scores on the five outcome measures.

Table 3: Mean and standard deviation scores on the five outcome measures within the Cued Autobiographical Questionnaire

	Mean	Std. Deviation
Pre mood induction		
Vividness	5.21	1.35
Personal importance	3.86	1.33
Emotionality	3.71	1.33
Valence	0.96	2.71
Recency	3.56	0.41
Post mood induction		
Vividness	5.52	1.24
Personal importance	4.12	1.54
Emotionality	3.80	1.46
Valence	0.45	2.19
Recency	3.35	0.60

The minimum score was 1 and the maximum score was 7 on vividness, personal importance and emotionality. Table 3 on the preceding page represents the mean score over the four cued memories. Therefore, the minimum score is 1.00 and the maximum score is 7.00 for each participant. Vividness scores range from 1.50 to 7.00, personal importance ranges from 1.25 to 7.00, emotionality from 1.00 to 6.67. Valence has a score that was rated on a minimum score -7 and maximum score +7. The valence scores observed range from -5.50 to 6.50. Recency is the mean score of the number of days over the four cued memories and is represented as log10. Log10 scores range from 0.70 to 4.50. Therefore, there is a good range demonstrated on all the self-rated measures obtained from the participants on the autobiographical questionnaire.

The minimum and maximum for the University of Wales Institute of Science and Technology Mood Adjective Checklist (the UWIST-MACL; Matthews et al., 1990) sub-scales are 8 to 32 for energetic arousal, tense arousal and hedonic tone. The minimum score for anger sub-scale is 5 and the maximum is 20. The results from the present study show a minimum score of 8 to a maximum score of 32 on the three main bipolar and 5 minimum and 20 maximum on the monopolar scale. The UWIST-MACL was used for subjective evaluation in this study, both as a general indicator of mood state and, more specifically, to evaluate changes in energetic arousal, tense arousal, hedonic tone and anger/frustration. Scores on the hedonic tone and energetic arousal scale are negatively related to the level of negative mood (low-scaled scores represent greater negative mood) whereas higher values reflect a significant negative mood on tense arousal and anger/frustration scales. Lowered energetic arousal equals less active and alert. Increased tense arousal is consistent with being more anxious and nervous. Lowered hedonic tone equals loss of interest and diminished pleasure response. Increased anger/frustration is consistent with more emotional feelings of anger and frustration.

2.3.2 Inferential analysis

2.3.2.1 Manipulation check

The paired sample t-tests were used to test the difference between pre and post mood induction scores for each sub-scale on the UWIST-MACL. The effect of negative mood induction on overall mood has been reported but the effect on individual mood components is less evident in the literature. Again, it is noted that a two tailed test might give less power but the uncertainty about the exact effect of negative mood induction on the individual mood components, somewhat individualistic response to mood induction and considering the consequences of missing an effect in the other direction, a two tailed test was considered necessary. Therefore, the researcher was predicting some relationship (e.g. mood induction will affect four sub-scales on the UWIST-MACL) but not predicting exactly what the directional relationship was in each mood dimension, i.e. that there will be a significant difference between pre and post mood

dimensions. Table 4 presents the t-tests for the UWIST-MACL. Statistical significance was set at $p < 0.05$ and all tests were two-tailed.

Table 4: Paired sample t-tests in the predictor variables on the UWIST-MACL

	Pre mood induction		**Post mood induction**			
	Mean	Std. Deviation	Mean	Std. Deviation	t (df)	Sig. (2-tailed)
Energetic arousal	22.85	4.08	20.39	4.40	3.83 (40)	.001***
Tense arousal	14.02	4.06	13.40	4.83	0.80 (41)	.430
Hedonic tone	26.39	4.01	23.56	5.05	4.50 (40)	.001***
Anger/frustration	7.09	2.60	8.02	3.32	-2.13 (43)	.039*

*** significant at the 0.001 level (2-tailed).
** significant at the 0.01 level (2-tailed).
* significant at the 0.05 level (2-tailed).

As predicted, there was a significant difference between pre-manipulation and post-manipulation mood ratings on the UWIST-MACL. The results show that energetic arousal showed a significant increase in negative mood ($t (40) = 3.83$, $p < 0.001$). Hedonic tone and anger/frustration showed a significant increase in negative mood ($t (40) = 4.50$, $p < 0.001$) and ($t (43) = -2.13$, $p < 0.05$). These results show a difference in post mood dimensions and have resulted in increased negative mood as measured by a decrease in hedonic tone and energetic arousal and an increase in anger/frustration. There was a non significant decrease in negative mood ($t (41) = .080$, $p = .430$, n.s.). The decrease in tense arousal may be due to the test-retest effect, i.e. tense arousal measures anxiety which may reduce with retest due to it being a more familiar task.

2.3.2.2 Intercorrelation of change scores on the UWIST-MACL and the Cued Autobiographical Memory Questionnaire (CAMQ)

To determine the relationship between changes in mood and evaluative judgement of autobiographical memory, change scores for the UWIST-MACL and CAMQ were calculated by subtracting participants' scores for the UWIST-MACL and participants' mean scores for CAMQ at pre mood induction from post mood induction. Two-tailed rather than one-tailed tests were used, as the researcher was predicting some relationship (e.g. mood induction will affect the cued autobiographical memories on CAMQ) but not predicting exactly what the directional relationship would be in each case, i.e. that there will be a significant difference between pre and post cued autobiographical memories on each measure. A p value < 0.05 was considered statistically significant.

Intercorrelations between the change scores on the UWIST-MACL and vividness, personal importance, emotionality and recency of memories were conducted to examine the relationship between change scores. Table 5a (on the next page) presents the Pearson correlation coefficients between change scores for the UWIST-MACL and cued five outcome measures on the autobiographical memory questionnaire (CAMQ).

Table 5a: Intercorrelation of change scores on the UWIST-MACL and the Cued Autobiographical Memory Questionnaire (CAMQ)

	EA Energetic Arousal	TA Tense Arousal	HT Hedonic Tone	AF Anger/ Frustration	V-V Vivid-ness	P-I Personal Importance	E-E Emotion-ality	V-A Valence
EA								
TA	-0.17							
HT	0.70***	-0.42**						
AF	-0.28	0.28	-0.34*					
V-V	0.15	-0.21	0.10	-0.23				
P-I	-0.27	-0.02	-0.26	0.01	0.18			
E-E	-0.35*	0.07	-0.31*	0.25	0.17	0.70***		
V-A	0.04	-0.10	-0.02	0.04	-0.05	0.09	-0.08	
R log10	0.03	0.12	0.06	-0.15	-0.28	-0.17	-0.17	-0.09

Key: EA = Energetic Arousal, TA = Tense Arousal, HT= Hedonic Tone, AF = Anger/Frustration, V-V = Vividness, P-I = Personal Importance, E-E = Emotionality, V-A = Valence, R log10 = Recency

*** Correlation is significant at the 0.001 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

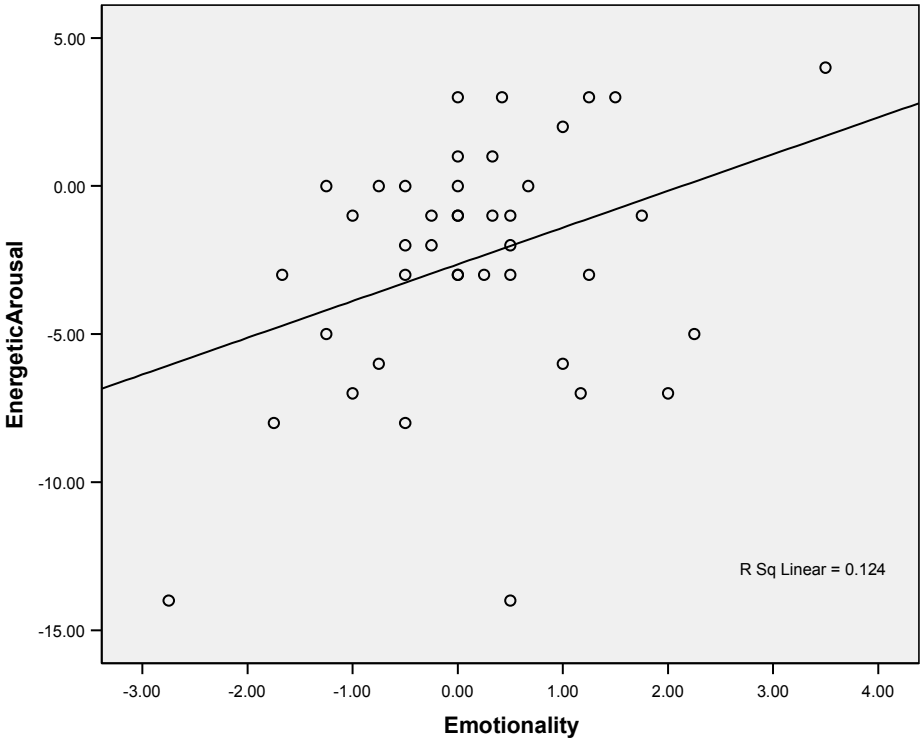
UWIST-MACL change score correlations

The correlations between the change scores on the UWIST-MACL suggest appropriate directional relationships considering that scales on hedonic tone and energetic arousal are negatively related to the level of negative mood (low-scaled scores represent greater negative mood), whereas higher values reflect a greater negative mood on tense arousal and anger/frustration scales.

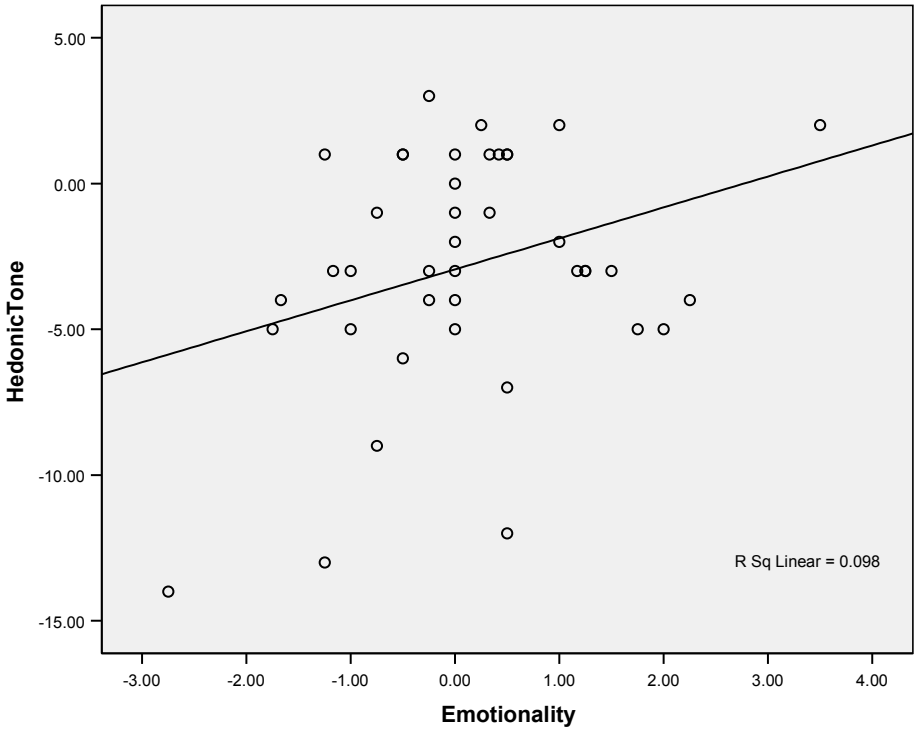
UWIST-MACL and CAMQ change score correlations

The correlations between the change scores on the UWIST-MACL and CAMQ appear at the bottom left of Table 5a. With regard to Hypothesis 1.3, there was a significant negative correlation between energetic arousal and emotionality of the autobiographical event ($r = -0.35$, $p < 0.05$ see Graph 1). This suggests that, as a person's negative mood increased, the emotionality of the autobiographical event increased. A further significant negative correlation was found between hedonic tone and emotionality ($r = -0.31$, $p < 0.05$ see Graph 2 on the next page).

Graph 1: Scatter plot for change scores between energetic arousal and emotionality



Graph 2: Scatter plot for change scores between hedonic tone and emotionality



This supports the previous finding that as a person's negative mood increased, the emotionality of the autobiographical event increased. The change score correlations in vividness, personal importance, valence and recency were non-significant. However, the scatter plot for appraisals of vividness and personal importance (Appendix 12) demonstrated that appraisals for vividness became less vivid (Hypothesis 1.1) and appraisals for personal importance became more personally important (Hypothesis 1.2) as mood becomes more negative i.e. sadder. The non-significance indicates that the researcher cannot exclude that the observed scatter plots have occurred by chance alone and considerable caution is taken and no causation is inferred.

CAMQ change score correlations

The change correlations between sub-scales on CAMQ indicated that key features such as vividness correlate positively with personal importance and emotionality, and negatively with valence and recency. Although non-significant,

it indicates the direction of the relationship between the variables. There was a significant relationship between emotionality and personal importance ($r = 0.70$, $p < 0.001$). This means that, as a person's emotionality increased, the personal importance of the autobiographical event increased.

Because hedonic tone and emotional arousal appeared to affect the emotionality of the retrieved autobiographical memory significantly, the researcher further probed the nature of the interrelations between these variables. Examinations of hedonic tone and emotional arousal revealed that the two predictors were strongly related ($r = 0.70$, $p < 0.001$). Given the strong relationship, it is possible that both mood variables appear to be predictors because of their shared variance. To examine this possibility an analysis of covariance was undertaken and emotionality was accounted for by energetic arousal and hedonic tone.

2.4 Discussion

2.4.1 Negative mood significantly affects emotionality

The results and their interpretation are tentative in the light of the exploratory nature and the lack of correction for multiple testing. The main finding from this study was that negative mood, as measured by hedonic tone and energetic arousal, may be influencing the emotionality of the cue memory. This supports Hypothesis 1.3 that there would be a significant difference. The evaluative judgement of emotionality showed significant negative correlations with energetic arousal and hedonic tone. This suggests that negative mood may be influencing the evaluative judgements of cued autobiographical memory retrieval and supports previous findings that suggest autobiographical retrieval is mood-dependent (Williams & Scott, 1988). The current experiment used neutral cue words in pre and post mood induction procedure, but rather than measuring response latencies, it measured evaluative judgements of memory retrieval in normal and negative mood states.

Before examining the specific relationship between mood and retrieval of autobiographical memory, the researcher assessed whether the mood manipulation was successful in inducing the desired negative affective state in participants. The UWIST-MACL showed significant change on three of its four sub-scales post mood induction. The three significant changes were hedonic tone, energetic arousal and anger/frustration. This confirms that the mood induction technique was effective in producing significant negative mood change in individuals.

The key finding was that emotionality was significantly correlated with two separate mood dimensions, one measuring arousal and other measuring valence aspects. Emotionality was significantly correlated with energetic arousal, indicating increased endorsements for de-active arousal state. McBride & Cappeliez (2004) found an association between arousal and potential availability of events in memory, with arousal component of mood being associated with overgeneral memories. Secondly, emotionality was significantly correlated with hedonic tone, indicating increased endorsements for discontentment. Tsai et al. (2000) found an association between emotionality and potential availability of events in memory, with negative mood being associated with increased emotional memories. The present findings are congruent with McBride & Cappeliez (2004) & Tsai et al. (2000). The results suggest that the increase in emotionality was due to the mood effects rather than increased access to affective information held with event-specific memory. The latter seems less likely, as sensory information (measured by vividness) demonstrated no significant change.

The mood predictor measure showed a significant change in the right direction on three of its four sub-scales, although the overall mood change was modest. The observed change in cued autobiographical memory correlations demonstrated a consistent directional pattern, although modest, which is not atypical for individual difference research. The statistical significant changes in mood predictor variables might explain the correlations between mood and

evaluative judgement of cued autobiographical events, which were modest but in an understandable direction.

2.4.2 Scatter plots for vividness and personal importance

Regarding Hypothesis 1.1, the scatter plots on the change score correlations demonstrated that vividness showed a non-significant decrease as mood became more negative in each of the four the UWIST-MACL mood sub –scales (see appendix 12). The non-significance indicates that the researcher cannot exclude that the observed scatter plots have occurred by chance alone and considerable caution is taken and no causation is inferred. This is congruent with previous research which showed that a decrease in vividness was affected by arousal and valence components of mood (Coluccia et al., 2006). Vividness is associated with how readily a participant is able to recall specific detail of place, time and context of the event. This is similar to Conway's (1990) description of autobiographical memories, which represents memories for specific experiences within a particular point in our lives. The present findings support previous findings that negative mood may result in more overgeneral memories (Yeung et al., 2006 and Barnard et al., 2006). This finding could indicate that memory retrieval is being abandoned earlier in its general retrieval stage and failing to move on to specific memory retrieval, supporting Conway and Pleydell-Pearce's (2000) hierarchal model of autobiographical memory.

Hypothesis 1.2, the scatter plots for the change scores correlations for personal importance on the UWIST-MACL for hedonic tone and energetic arousal indicates a non-significant increase as mood became more negative (Appendix 12). The non-significance indicates that the researcher cannot exclude that the observed scatter plots have occurred by chance alone and considerable caution is taken and no causation is inferred. The effect of mood on personal importance is supported by Dalgleish et al. (2001). Talarico & Rubin (2003) investigated the salient characteristics of emotion and concluded that personal significance would appear to be a component of accessing event-specific memories. This is further supported by the increased personal importance of the memory and the

increased emotionality observed in memory retrieval. The interpretation could suggest that emotional aspects, such as personal importance, rather than sensory aspects, such as vividness, could be showing emotional reactivity to negative mood. Emotional reactivity has been defined as the relative ease with which emotional responses are triggered by mood (Chentsova-Dutton, Chu, Tsai, Rottenberg, Gross & Gotlib, 2007).

2.4.3 Conclusion

The mood manipulation did result in mood effects on emotionality which demonstrated a significant increase with decrease in energetic arousal and hedonic tone. Vividness change score correlations were non significant but the scatter plots for four mood sub scales indicated modest directional change on appraisals of vividness, which become less vivid with increase in negative mood. Personal importance change score correlations were non significant but the scatter plots for energetic arousal and hedonic tone indicated modest directional change on appraisals of personal importance, which become more personally important with decrease in energetic arousal and hedonic tone. The scatter plots and modest changes observed are understandable, as autobiographical content is reliant on memory schema that is less open to mood effects (Young, 1999; Young, Klosko & Weishaar, 2006). Overall mood induction had a significant impact on mood in three out of four mood sub-scales on the UWIST-MACL, and is taken to be a useful way to reduce mood in an incremental way in a group procedure. Autobiographical technique showed that mood induction could cue more emotional memories, less vivid and more personally important, but these were modest and, in light of previous research findings, individual differences are not atypical in mood induction (Westermann et al., 1996).

It is noted that this study looked at the sensory and affective information attached to memories rather than the cognitive content of memories. Sensory detail refers to the extent that sensory detail such as sounds, smell and tastes are re-experienced during autobiographical retrieval (Sutin & Robins, 2007). The vividness measure in the present study refers to the visual clarity and visual

intensity of the autobiographical memory and can be seen as sensory in that it aims to measure the visual sense over and above other sensory information (Sutin & Robins, 2007). The single nature of the vividness item does mainly focus on vividness as a visual sense but may encapsulate other sensory dimensions to a lesser extent. However, utilising multiple items or a questionnaire to cover all sensory dimensions would have been problematic due to the multiple independent and dependent measures already involved in the present study.

It is also recognised and noted that overarching models such as Bower's associative network (Bower, 1981) and Teasdale & Barnard's (1993) interactive sub systems framework suggest that accessibility is likely to be improved and therefore observed in research when measuring cognitive content rather than sensory or emotional content. This is by virtue that cognitions are more stable and reactive than the more ephemeral sensory and affective appraisals which are deeper in the event-specific memory (Oatley, Keltner & Jenkins, 2006). This might explain why the resultant correlations were modest but generally in an understandable direction.

The findings from the present study suggest that sensory information, specifically vividness, becomes less available for appraisal in negative mood states, which might be due to the lack of accessibility to event-specific memories. It is not known if this is a direct consequence of negative mood or the result of a previous history of depression or any other third variable. Affective and contextual attributes showed a moderate increase in availability for appraisal in negative mood state. Joorman & Gotlib (2008) suggest that negative mood activates corresponding emotional content in memories. This is consistent with top down hierarchical search from semantic, categorical to specific memories. Negative mood is proposed to result in a truncated search, in which individuals prematurely abandon their search at a higher, less specific stage but still containing the emotional but not sensory aspects (Williams, Chan, Crane, Barnhofer, Eade & Healy, 2006b). Theoretically, the hierarchical framework of

autobiographical memory has been a useful model to explain patterns of recall of sensory and affective information from autobiographical memory.

The second empirical limitation of the present study is the restricted range on the autobiographical sensory and affective content scores. The restricted range on the markers may have been a reason for the non-detection of significant association between mood and autobiographical memory. The relatively small changes observed in the shift of autobiographical markers may reduce the likelihood of detecting any associations. Given the evidence from this study and limitations, it may prove fruitful to examine more specific cognitive content within the retrieved autobiographical memories. This may be particularly beneficial as there are a number of content changes that can be tapped by using implicit measures of autobiographical memory. It can be predicted that cognitive content might be more readily available to appraisals due to its availability near the start stage of the autobiographical search hierarchy. This is consequently addressed in the next study.

CHAPTER 3

STUDY 2: Autobiographical memory responsiveness to an induced negative mood state: Cognitive appraisals in symptomatic and non-symptomatic students.

3.1 Introduction

Study 1 found evidence that negative mood may be influencing the emotional aspects of cued autobiographical memory retrieval. There was a suggestion that sensory information, specifically vividness, becomes less available for appraisal in negative mood states, which might be due to the lack of accessibility to event-specific memories. These findings generally support previous studies that suggest that some aspects of autobiographical retrieval are reactive to mood (Jallais & Gilet, 2010; Williams & Scott, 1988). This present study builds on this initial evidence for low mood affecting autobiographical memory by further examining whether the cognitive products following a negative mood induction procedure are sensitive to change.

3.1.1 Theoretical background

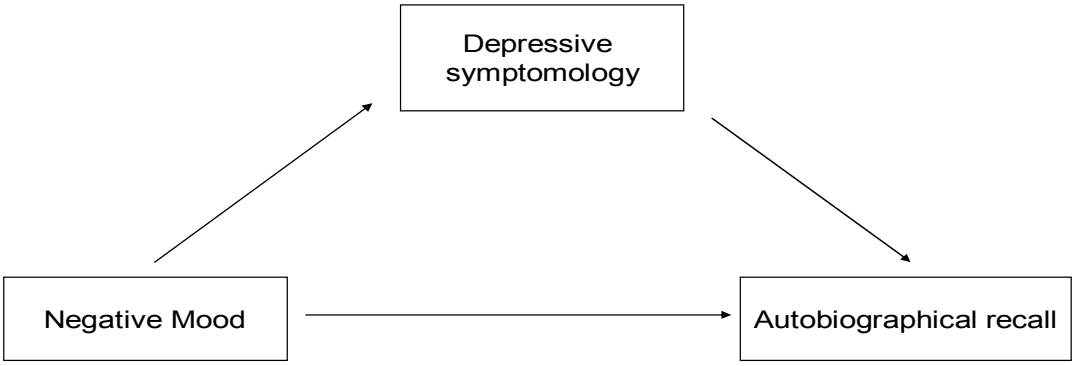
Information processing theories are an important theoretical framework to discuss in relation to mood and cognitive change, Bower's associative network theory (Bower, 1981 & 1987) and Beck's Schema theory (Beck, 1976 and Beck, Emery & Greenberg, 1986) being two dominant frameworks. First, Bower's associative network theory (Bower, 1981 & 1987) has given rise to the Ingram (1984) & Teasdale (1988) information processing models of cognition and memory. The Ingram (1984) & Teasdale (1988) accounts suggest that negative mood may be involved in the activation of negative cognitive structures. The suggestion that depressive mood acts as a primer of depressogenetic cognitive structures is central to such a mood state hypothesis. Secondly, Beck's Schema theory (Beck, 1976; Beck et al., 1986) additionally suggests that trait attributes such as depressive symptomatology would have little effect in the absence of a temporary negative mood state. Depressive symptomatology includes symptoms

such as pessimism, self-dislike, self-criticalness, suicidal thoughts or wishes, and worthlessness and somatic symptoms including loss of energy, change in sleep patterns and irritability. Schema theory (Beck, 1976) suggests that individuals develop negative assumptions about the world through early developmental experiences that develop into self schemata. These schemata are stable across situations and mood states but are dormant during non-negative mood states. When activated, the schemas will influence the individual self-compensatory coping strategies (Wang, Brennen & Holte, 2005). Studies such as Wang et al. (2005) and Clark et al. (1999) demonstrate that individuals showing current depressive symptomatology report more dysfunctional cognitive structures than those not currently showing symptomatology. Additionally, prospective studies suggest that the pre-existence of depressive symptomatology is a key indicator of non-specificity of autobiographical memories (Brittlebank et al., 1993; Kuyken & Dalgleish, 1995). Non-specificity phenomenon refers to a tendency in some people to retrieve past experiences in an overgeneral way that lacks factual information in the form of actors, actions, locations, and also lacks context-specific sensory and perceptual attributes (Raes et al., 2007).

Consistent with information processing models and trait attributes, there is growing support in the literature for the argument that the vulnerability to changes in autobiographical content may be activated by mood state and the presence of moderating factors (Fresco, Heimberg, Abramowitz & Bertram, 2006). A moderator is a variable that influences the strength of a relationship between two other variables, and a mediator variable is one that explains the relationship between the two other variables (Baron & Kenny, 1986). Depressive symptomology was operationally defined as a moderator variable as it might be helpful in explaining the strength of the relationship that exists between mood and cued autobiographical memory. To date, however, little research has investigated the effects of mood state and moderating factors on cued autobiographical content. Therefore, the present study turns its attention to depressive symptomatology, a trait factor that might be implicated in mood state effects on autobiographical recall. Figure 4 (on the next page) shows the

potential for depressive symptomatology acting as a moderator on mood state affecting autobiographical recall.

Figure 4: Depressive symptomatology as a moderator



Empirical studies within clinical and subclinical populations have provided important insights into how mood effects may change certain sensory and cognitive variables in autobiographical memory (Coluccia et al., 2006; Gemar et al., 2001; Wenze, Gunthert & Forand 2007; van Vreeswijk & de Wilde, 2004). Mood induction experiments with clinical populations have also shown cognitive reactivity to be sensitive to mood states (Gemar et al., 2001; Wenze et al., 2007). Cognitive reactivity has been defined as the relative ease with which maladaptive cognitions or cognitive styles are triggered by mild mood fluctuations (Segal et al., 1999). Those with a history of a depressive illness are also observed to show increased cognitive reactivity compared with those with no previous depressive history (Miranda et al., 1998; Miranda & Persons, 1998). In the present study the researcher sought to add to the literature by looking at autobiographical content, specifically cognitive aspects, to determine the effects of negative mood on autobiographical retrieved content.

The effects of mood state are also seen in autobiographical memory within non-clinical populations in the phenomena of overgeneral memories (Barnard et al., 2006; Raes et al., 2007; Yeung et al., 2006). Support for Information processing accounts has predominately come from laboratory experiments using mood induction procedures (Bowers, 1981; Ingram, 1984; Teasdale, 1988). These studies indicated that when participants were in a negative mood state they recalled significantly more negative autobiographical events from their past, but when in a happy mood induced state they recalled more happy autobiographical memories. Further investigation suggested that the empirical data was not as symmetrical as the information processing theories might suggest (Power & Dalgleish, 1997). The participants with the negative induced mood seemed to show decreased accessibility to positive memories more than increased access to negative ones (Power & Dalgleish, 1997). There have been a number of suggestions put forward to account for the non-symmetrical data, such as relevancy of stimuli to participants and whether difference cognitive processes in individuals are differently affected by mood state, such as working memory, executive function and cognitive control (Harvey, Le Bastard, Pochon, Levy, Allilaire, Dubois & Fossati 2004; Marvel & Paradiso, 2004).

Studies suggesting that negative mood seems to influence the retrieved content of autobiographical memories and specific aspects of cognitive content are presented next. Firstly, memories that are high in perceptual origin will give rise to increased typicalness appraisals because memories with high perceptual and sensory detail increase the likelihood of the memory search accessing such memories and rehearsing the same memories more frequently (Johnson et al., 1988). There is evidence that negative mood may decrease one's ability to recall memories rich in sensory detail (Coluccia et al., 2006). Memories rich in sensory detail and perceptual origin are seen as specific event memories rather than overgeneral memories (van Vreeswijk & de Wilde, 2004). Secondly, rumination is considered to be a repetitive focus on present causes of current low mood (Williams, Barnhofer, Crane & Duggun, 2006a). Negative mood and ruminative response and overgeneral autobiographical memory seem to be interconnected.

Williams et al. (2006a) suggest that ruminative style is encouraged by negative mood, which takes up memory resources and results in output of overgeneral memories.

Thirdly, mood change is strongly linked to social interaction (Watson & Clark, 1994). Negative mood is thought to propagate negative evaluation of other people and be important to feelings of social inclusion (Ryan & Deci, 2000; Seidner, 1991; Watson & Clark, 1994). Fourthly, mood seems to affect record of past experience, which in turn affects future ability to imagine future scenarios (Williams et al., 2006a). Negative mood is thought to interfere with an individual's ability to conceptualize and judge the likelihood of future events (Williams et al., 2006a). There is also evidence that personal importance of a memory is influenced by negative mood by raising the potential that negative memories about events have greater personal significance (Williams et al., 2008).

The last two characteristics, desirability and valence, seem similar but are distinct conceptual phenomena (Barrett, 1996). The emotion can have a positive or negative valence (Remmington, Fabrigar & Visser, 2000), whereas desirability of an emotional state is defined by the context and is separate from valence (Barrett, 1996). Negative mood seems to lower individual engagement with environment and ratings of social context, which in turn affects desirability (Ryan & Deci, 2000). However, valence is seen as a continuum indicating how positive or negative an event is, which can be seen as the degree of displeasure or contentment (Remmington et al., 2000). Negative mood has also been seen to increase the retrieval of negatively valenced autobiographical memories (Walker et al., 2003).

3.1.2 Trait and state issues in cognitive reactivity

Unresolved issues for this study appear to be what mood dimensions are important in cued autobiographical content and whether depressive symptomatology influences cognitive reactivity. Firstly, the findings from a number of these studies suggest that the cognitive products are only detectable when in negative mood in those showing depressive symptomatology or with a previous history of depression (Miranda & Persons, 1998; Wang et al., 2005). This implies that cognitive products could be state dependant.

Secondly, it is clear that there are different taxonomies which exist when describing cognitive styles. Schemas and dysfunctional attitudes have been called 'cognitive structures', whereas automatic thoughts have been described as 'cognitive products' (Brewin, Reynolds & Tata 1999). It is these cognitive structures and products in autobiographical appraisal that are of interest in the present research, and which are activated in autonoetic consciousness when recalling past personal memories (Conway, 2005). The majority of studies looking at cognitive styles have used self-reported measures that rely on conscious and explicit cognitive processes to assess cognitive styles rather than automatic and implicit processes as in the present research. The non-symmetrical data may be due to the type of cognitive content that is being measured and the conditions at the time of measurement (Raes et al., 2007). In summary, very little is known about mood effects on cognitive appraisal in autobiographical memory retrieval in non-clinical populations.

3.1.3 Purpose of the study

The study to an extent is exploratory, because there is some evidence on the effects of depressed mood, but less evidence on the effects of individual negative mood components on autobiographical retrieval. This study sought to understand the effect of negative mood on cognitive content in autobiographical retrieval in those with and without depressive symptomatology, as previous work reported that the change in depressive symptomatology in a non-clinical population significantly predicted memory overgenerality (Mackinger, Loschin & Leibetseder,

2000). Mood induction experiments with non-clinical participants support the observation of reduced autobiographical memory specificity when in negative mood states (Barnard et al., 2006; Raes et al., 2007; Yeung et al., 2006) but not cognitive content, which has predominately been seen in depressed population or those with a history of depression (Gemar et al., 2001; Wenze et al., 2007).

Accordingly, the present research investigated the association between negative mood and its effects on cognitive content and memory changes on the free recall of autobiographical memories in relation to depressive symptomatology. Although the current sample was unlikely to be clinically depressed due to selection from the non-clinical population and active screening out of depression, the variable of depressive symptomatology was nevertheless thought important because of the empirical evidence of depressive disorders affecting autobiographical memories (van Vreeswijk & de Wilde, 2004). The researcher has therefore used the term depressive symptomatology rather than depression to refer to the variable of interest, as has also been done in previous research (Wenze, Gunthert & Forand, 2010).

The idea of the present study was to evoke event-specific memories by asking participants to rate the memory event on a number of characteristics. The characteristics as identified in section 3.1.1 were: typicalness, rumination, importance of other people, expectancy, personal importance, desirability and valence of the event retrieved. Researchers interested in autobiographical memory and associated retrieval typically used single items or items pools which contain single items on a dimension related to the construct to assess memory (Sutin & Robins, 2007). The construction of item pools to assess the most dominant dimensions of autobiographical memory has been endorsed by previous researchers (Sutin & Robins, 2007). The present study identified the dominant characteristics in autobiographical memory and constructed a single item question to assess the dimensions and mapped onto questionnaires assessing the phenomena (Table 5b on the next page).

Table 5b: Single item dimensions and mapping with questionnaires for the phenomena in Studies 2 - 3

Construct	Question on questionnaire	Mapping to Literature
Typicalness	How typical is the event in your life?	Memory Characteristic Questionnaire (MCQ; Johnson, Foley, Suengas & Raye, 1988). Memories that are high in perceptual origin will give rise to increased typicalness appraisals (Johnson et al., 1988).
Rumination	How often do you think about it?	Response Style Questionnaire (RSQ) measures rumination (Nolen-Hoeksema & Morrow, 1991). For each item the respondents indicate "how often" they experience the event.
Importance of other people	How important were other people in the event?	Memory Experience Questionnsire (MEQ; Sutin & Robins, 2007)
Expectancy	Was the event expected?	Impact of Future Events Scale (IFES; Deeprose & Holmes, 2010)
Importance of the event for self	How important was the event for you?	Autobiographical Memories Questionnaire (AMQ; Rubin, Schrauf & Greenberg, 2003)
Desirability	How desirable was the event?	Impact of Future Events Scale (IFES; Deeprose & Holmes, 2010)
Valence	How did you feel about the event at the time?	Memory Characteristic Questionnaire (MCQ; Johnson, Foley, Suengas & Raye, 1988)

For example, the single item "How often you think about it" was mapped with the Response Style Questionnaire (RSQ) which measures ruminative style and content (Nolen-Hoeksema & Morrow, 1991). This measure asks respondents to indicate how often they engage in ruminative thoughts or behaviours. For each item the respondents indicate "how often" they experience the event on a Likert

Scale. The single item was taken as a “proxy” for rumination rather than salience because of the item pools in Response Style Questionnaire (Nolen-Hoeksema & Morrow, 1991).

To address the general aim of how mood affects autobiographical retrieval, participants rated a number of characteristics, and endorsed them on an analogue scale. The endorsements were observed pre and post mood induction and observed against four dimensions of negative mood as measured by the UWIST-MACL (Matthews et al., 1990). The general aim was propagated in response to the lack of research investigating how mood affects the recalled content retrieved in autobiographical memories. Furthermore, by examining the influence of pre-standing depressive symptomatology and its effects on the accessibility of the cognitive products pre and post mood stress, the aim was to elucidate the importance of trait depressive symptomatology in the presence of temporary mood induction.

As attested by the studies within this chapter, the dimensions of typicalness, rumination, importance of other people, expectancy, personal importance, desirability and valence of the event retrieved seem to be important attributes of autobiographical memories affected by mood state, yet there appears to be little research available to demonstrate how these variables are influenced by current negative mood and trait depressive symptomatology. Theoretical and empirical data have focused in somewhat different units of analysis, but have emphasised the critical content in autobiographical memory that might be state-dependent. These cognitive attributes have been suggested to guide appraisal and interact with current mood to influence memory search and attention (Williams, Watts, MacLeod & Mathews, 1997).

The present study employed a non-clinical sample to examine change score correlations between mood components and autobiographical content whilst examining the influence of pre-standing depressive symptomatology. A sample of

students underwent autobiographical memory tests focusing on memory appraisal prior to and following a negative mood induction procedure. The mood induction procedure is intended to induce a negative mood, which in some individuals could increase cognitive reactivity resulting in autobiographical content being negatively correlated with negative mood state. However, the mood induction could also generate increased general level retrieval resulting in autobiographical content being positively correlated with negative mood state. The content held within autobiographical content may be influenced by such processes in negative mood state. Interestingly, there appears to be a lack of research investigating not only how mood influences cognitive reactivity within autobiographical memory, but also how mood might also influence overgeneral memories.

In summary, the influence of negative mood on autobiographical memory appears to be generally consistent with the prediction of change in the seven characteristics in negative mood state; negative mood may show a correlation with typicalness, desirability, rumination, importance of other people, expectancy and negatively valent events. These characteristics may be more pronounced in those showing depressive symptomatology or may show a difference in the direction of the correlation. The present research investigated the correlations between mood components as measured by the UWIST-MACL and the effects on both content-based attributes and memory changes on the free recall of autobiographical memories in those with and without depressive symptomatology. The characteristics of autobiographical memory highlighted have emerged from research and opened up further questions on the effects of negative mood on secondary appraisal or recollective experience when recalling autobiographical content.

The present study was designed to address two areas of uncertainty concerning mood effects on autobiographical retrieval:

(a) Is autobiographical content a characteristic of current mood state or a characteristic of depressive symptomatology as measured by the Beck Depression Inventory (BDI)?

(b) How are the seven autobiographical content characteristics related to four components of negative mood as measured by the UWIST-MACL (Matthews et al., 1990)?

From these general aims a number of specific hypotheses were developed to investigate the effects of mood on autobiographical retrieval. It was hypothesised that negative mood would predict a change from pre to post mood induction in the endorsements on the Cued Autobiographical Memory Questionnaire. Specifically, it was hypothesised that negative mood would predict a change in endorsements of:

i) typicalness in cued autobiographical recall (Coluccia et al., 2006)
ii) ruminative response in cued recall (Williams et al., 2006a)
iii) negative evaluation of the importance of other people (Ryan & Deci, 2000)
iv) the ability to conceptualize and judge the likelihood of future events (Williams et al., 2006a)
v) personal importance of cued memory recall (Williams et al., 2008)
vi) desirability in cued memory recall (Ryan & Deci, 2000)
vii) valence in cued memory recall (Walker et al., 2003).

$H_{2.1}$ It was hypothesised that there would be a change from pre to post mood induction on the cued autobiographical memory characteristics i-vii above

$H_{2.2}$ It was hypothesised that there would be a difference between the symptomatic and non-symptomatic endorsements for characteristics i- vii above.

$H_{2.3}$ It was hypothesised that there would be a change from pre to post mood induction in negative automatic thoughts as measure by the Automatic Thoughts Questionnaire.

3.2 Method

3.2.1 Participants

Seventy-three students from the University of Chester's Faculty of Health and Social Care participated in the study. Students in the present study had not participated in the previous study. The mean age of the sample was 33.50 years, standard deviation 9.40 with a range of 18-49 years. The sample consisted of 70 female and 3 male participants. 7 participants were excluded for their own protection on the basis of their high BDI-2 score (see section 2.2.3 for ethical procedure and support offered to all participants). A power calculation was conducted on GPOWER, a general power analysis program (Erdfelder et al., 1996). A sample size of 73, with alpha level set at $p = 0.05$, a large effect size ($r = 0.5$), gives 99% power to detect real difference due to treatment effect rather than chance.

Ethical approval was granted by the Psychology Departmental Ethics Committee prior to data collection, and ethical approval for access to students was granted by the Faculty of Health and Social Care Ethics Committee prior to recruitment of participants. Written informed consent was sought from each participant. Participants were advised that the information they provided would be used in the present research. The study's purpose was stated and technical terms explained. The participants were told the type of information that would be obtained and the nature of the commitment. Potential risks or costs were discussed. A confidentiality pledge was made and assured through the procedures described below. The researcher clearly indicated that participation was strictly voluntary and no penalties or loss would be incurred by non-participation. The researcher asked each participant to sign a written consent form.

The participant's name was not on any materials other than the consent form. Instead of using names to keep track of individual data, the researcher assigned random identification numbers. These numbers remain the only information that linked the student responses. Once the student left the research project, the consent form was completely separated from other materials so that no one could identify a particular student's responses.

3.2.2 Materials & measures

The following four psychometric materials and measures were utilised in this study, along with the mood induction procedure.

Depressive Symptomatology

The Beck Depression inventory – Version 2 (Beck et al., 1996) was utilised as in Study 1 to assess the level of depression and screen out moderate and severely depressed students for their protection. The BDI II has demonstrated good internal reliability and validity (alpha = .82, test-retest reliability between .65 and .72; Vazquez & Sanz, 1991). Following the example of Dickson & MacLeod (2006) and Goddard, Dritschel & Burton (1997), the present study classified non-symptomatic as ≤ 7 on BDI II. Mildly symptomatic was categorised as ≥ 8 on BDI II the categorisation of Levine, Litwins & Frye (2006) categorisation. Several studies reported strong psychometric properties in student populations (Sprinkle, Lurie, Insko, Atkinson, Jones, Logan & Bissada, 2002; Storch, Roberti and Roth, 2004; Whisman, Perez & Ramel, 2000).

Mood State

The University of Wales Institute of Science and Technology Mood Adjective Checklist (the UWIST-MACL; Matthews et al., 1990) was utilised as in Study 1. The psychometric properties were identified for the UWIST-MACL and shown to have good internal reliability and validity for non-clinical mood variations (Matthews et al., 1990).

Cued Autobiographical Memory Questionnaire (CAMQ)

The first outcome measure is the adapted Cued Autobiographical Memory Questionnaire focusing on cognitive appraisals (modified version AMT; Williams & Broadbent, 1986). The cognitive events focused on typicalness, rumination, valence, involvement with other people, expectancy, desirability and personal importance. The modified version of the Autobiographical Memory Test (AMT; Williams & Broadbent, 1986) has been widely used to assess autobiographical content and has been found to have good reliability (Williams et al., 2007). Participants were asked to rate each of the four memories on a 7-point Likert scale (ranging from -3 to +3). The two sets of four neutral words were presented on a PowerPoint projector and displayed for 30 seconds. The four words from list A were *bike*, *tree*, *shed* and *supermarket*, and on list B *car*, *flower*, *garage* and *shop*. Set A and set B were alternated for pre and post mood induction procedure within the different groups.

Cognitive products

The inclusion of a second outcome measure was the Automatic Thoughts Questionnaire (ATQ; Hollon & Kendall, 1980) which was utilised as a new assessment for the present study to assess cognitive products (Appendix 9). The measure assesses the frequency of automatic thoughts associated with depression. Participants rated 30 questions on a 5-point Likert scale indicating frequency of rumination (1 = not at all, 5 = all the time). Scores could range from 30 to 150, with a high score indicating frequent occurrence of negative automatic thoughts. The ATQ has the ability to differentiate between the depressed and non-depressed with a high internal consistency, alpha = .96 (Hollen & Kendall, 1980). Satisfactory psychometrics have been identified recently on the ATQ (Chioqueta & Stiles, 2004). The ATQ contains four sub-scales of personal maladjustment and desire for change, negative self-concept and negative expectations, low self-esteem and giving up/helplessness.

Mood Induction

The intervention phase utilised the Velten Mood Induction Procedure (Velten, 1968) as in Study 1. The Velten Procedure has been found to mimic the affective disturbance and behavioural attributes of depressive states (Bates et al., 1999).

3.2.3 Procedure

Following the same procedure as in Study 1, the Beck's Depression Inventory BDI II (Beck & Steer, 1993; Beck, Ward, Mendelson, Mock & Erbaugh, 1961) was used as a screening questionnaire to assess the level of depression and screen out moderate to severely depressed students for their protection. Participants scoring 13 and above were not permitted to continue on to the mood induction procedure for their own safety as such scores indicated 'moderate' or 'severe' depression. Groups of twenty to thirty participants at a time were asked to complete the Mood Adjective Checklist psychometric measure (the UWIST-MACL; Matthews et al., 1990). The mood measure provided the baseline mood scores for the study and was used as the predictor variable.

The inclusion of the Automatic Thoughts Questionnaire (ATQ; Hollon & Kendall, 1980) was administered with the instruction and was utilised to assess cognitive products. The surface-level cognitions assessed by the Automatic Thoughts Questionnaire may be more readily accessible in negative mood state than those non-surface-level cognitions assessed by the Cued Autobiographical Memory Questionnaire (CAMQ). The adapted CAMQ was administered next, and assessed cognitive content as opposed to the evaluative characteristics of feelings and emotions explored in Study 1. Participants were instructed to report the first specific personal memory triggered by each stimulus word and write down as much detail as necessary. The experimenter read each word aloud as it was displayed on the PowerPoint projector. After the four cue words, the participants were given a scoring sheet to rate certain characteristics of each memory, and were asked to rate each of the four memories on a 7-point Likert scale (ranging from -3 to +3).

The same procedure was followed as detailed in Study 1 for the mood induction technique. At time point 2, the same participant group were administered the Mood Adjective Checklist measure, Automatic Thoughts Questionnaire and the cued autobiographical memory task (Word list A & B were used in rotation with each group). As with Study 1, the researcher provided debriefing and contact details for the student counselling service.

3.2.4 Design and analysis strategies

This experiment had a repeated measures design. The experimental variable was mood as measured by The Mood Adjective Checklist (the UWIST-MACL) with four sub-scales. The experimental outcome measures were the Cued Autobiographical Memory Questionnaire having seven response variables, and the Automatic Thoughts Questionnaire (ATQ) having four response variables. The predictor and outcome variables were defined and are listed in Table 6 below.

Table 6: List of predictor and outcome variables

Independent/predictor/ explanatory Variable(s)	**Dependent/outcome Variable(s)**
The University of Wales Institute of Science and Technology Mood Adjective Checklist (UWIST-MACL)	*Cued Autobiographical Memories Questionnaire (CAMQ)*
	Typicalness, Rumination, Importance of other people, Expectancy, Importance of the event for self, Desirability and Valence
Energetic Arousal (EA)	
Tense Arousal (TA)	*Automatic Thoughts Questionnaire (ATQ)*
Hedonic Tone (HT)	Personal Maladjustment & Desire for Change
Anger/frustration (AF)	Negative Self-Concept & Expectations
	Low Self-Esteem and Giving Up/Helplessness

The first outcome variables were obtained from the Cued Autobiographical Memory test. Participants rated a number of cognitive characteristics, such as: how typical, rumination, valence, how important other people were expectancy, desirability and importance for self. The second outcome variables were obtained from the Automatic Thoughts Questionnaire (ATQ). The measure was used to assess the amount and type of negative automatic thoughts. The questionnaire has four sub-scales: personal maladjustment and desire for change; negative self-concept and expectations; low self-esteem; and giving up/helplessness.

The first stage of analysis involved the completion of the pre and post scores on the UWIST-MACL, CAMQ and ATQ. The recorded participant number allowed matching for pre and post scores for each participant. This stage also involved dividing up the Beck Depression Inventory (BDI-II) scores into non-symptomatic and symptomatic. The scores were divided following the categorisation of Dickson & MacLeod (2006) and Goddard et al. (1997) as non-symptomatic ≤ 7 on BDI II. Symptomatic was categorised as ≥ 8 on BDI II, following the categorisation of Levine et al. (2006).

The students t-test was performed on the UWIST-MACL, CAMQ and ATQ pre and post mood induction mean scores to test for statistical significance. Normality was determined using the Kolmogorov-Smirnov test. The relationship of interest was the change scores between time 1 and time 2 (pre and post mood induction), so the differences between measurements were used for the analysis. The change scores were calculated and intercorrelations were preformed between the UWIST-MACL and CAMQ as detailed in Study 1 (section 2.2.4 on design and analysis strategies). The intercorrelations were organised into non-symptomatic and symptomatic grouping were based on the BDI-II scores. The Intercorrelations on the change score were also preformed on the UWIST-MACL and Automatic Thoughts Questionnaire (ATQ). Significant tests were two-tailed rather than one-tailed, as the present research was interested in the relationship between mood and effect on cued autobiographical memory measures. The

present research did not predict the exact directional relationship but rather that a relationship does exist.

3.3 Results

3.3.1 Descriptive statistics

The minimum and maximum for the UWIST-MACL sub-scales are 8 to 32 for energetic arousal, tense arousal and hedonic tone. The minimum score for anger sub-scale is 5 and the maximum is 20. The results from the present study show a minimum score of 8 to a maximum score of 32 on the three main bipolar, and 5 minimum and 20 maximum on the monopolar scale. Table 7 presents the means and standard deviations for scores on the UWIST-MACL sub-scales for BDI scores 0–7 and 8 & above. The first two columns show the mean scores and standard deviation on each of the four sub-scales of the UWIST-MACL for participants with BDI scores between 0–7. Scores on the hedonic tone and energetic arousal scale are negatively related to the level of negative mood (low-scaled scores represent greater negative mood), whereas higher values reflect a greater negative mood on tense arousal and anger/frustration scales. The post mood induction scores showed increased negative mood on each of the four sub-scales of the UWIST-MACL.

Table 7: Mean and standard deviation for scores on the UWIST-MACL sub-scales pre and post mood induction for BDI scores 0–7 and BDI 8 & above

	BDI 0-7		**BDI 8 & above**	
	Mean	Std. Deviation	Mean	Std. Deviation
Pre mood induction				
Energetic arousal	19.48	2.19	20.17	2.77
Tense arousal	19.35	2.71	19.42	3.52
Hedonic tone	21.39	2.04	20.95	2.12
Anger / frustration	6.58	1.94	8.75	3.39
Post mood induction				
Energetic arousal	20.50	2.48	19.37	4.03
Tense arousal	19.47	2.81	20.32	4.55
Hedonic tone	21.04	2.42	19.05	3.91
Anger / frustration	8.27	3.65	11.60	4.57

Table 7 also presents the mean and standard deviation for scores on the UWIST-MACL sub-scales for BDI scores 8 and above in last two columns. The post mood induction scores for BDI scores 8 and above show increased negative mood on each of the four sub-scales of the UWIST-MACL. Energetic Arousal mood component demonstrates an increase in negative mood for BDI 8 and above, but a decrease in energetic arousal for BDI between 0 and 7. It is important when looking at the UWIST-MACL values to remember that energetic arousal and hedonic tone are negatively related to the level of negative mood i.e. as hedonic tone scores go down, the level of negative mood goes up. However, tense arousal and anger/frustration are positively related to the level of negative mood i.e. as anger/frustration goes up, the level of negative mood goes up. Table 8 presents means and standard deviations for scores on the cued autobiographical questionnaire sub-scales for BDI scores 0–7 and 8 & above.

Table 8: Mean and standard deviation scores on the seven outcome measures within the Cued Autobiographical Questionnaire for BDI scores 0–7 and 8 & above

	BDI 0-7		**BDI 8 & above**	
	Mean	Std. Deviation	Mean	Std. Deviation
Pre mood induction				
Typical	4.17	1.73	3.63	1.42
Rumination	3.47	1.20	3.91	1.15
Valence	5.10	1.19	4.79	1.32
Other people	5.67	1.29	5.74	0.91
Expected	4.44	1.15	4.54	1.13
Desirable	4.53	1.29	4.62	1.50
Personal importance	5.22	1.26	5.26	1.13
Post mood induction				
Typical	3.92	1.53	4.16	1.64
Rumination	3.81	1.26	4.36	1.33
Valence	4.95	1.23	4.62	1.60
Other people	5.49	1.26	5.92	0.83
Expected	4.46	1.31	4.82	1.55
Desirable	4.76	1.52	4.69	1.56
Personal importance	5.41	1.22	5.50	1.16

The minimum score was 1 and the maximum score was 7 on each of these self-rating Likert scales. The first two columns represents the mean score over the

four cued memories on each of the seven outcome variables for participant with BDI score 0–7. The minimum score is 1.00 and the maximum score is 7.00. Typical scores range from 1.00 to 7.00, rumination ranges from 1.00 to 6.50, valence from 2.50 to 7.00, other people from 2.00 to 7.00, expected from 1.00 to 6.75, desirable from 1.00 to 7.00 and personal importance from 1.00 to 7.00.

Table 8 also presents the mean score over the four cued memories on each of the seven outcome variables for participants with BDI score 8 and above in the last two columns. The minimum score is 1.00 and the maximum score is 7.00. Typical scores range from 1.00 to 6.75, rumination ranges from 1.00 to 6.50, valence from 1.50 to 7.00, other people from 3.50 to 7.00, expected from 1.25 to 6.50, desirable from 2.00 to 7.00 and personal importance from 2.25 to 7.00. There is a good range demonstrated on all the self-rated measures obtained from the participants on the autobiographical questionnaire.

3.3.1.1 Automatic Thoughts Questionnaire (ATQ) and its four sub-scales

Scores on the ATQ can range from 30 to 150. A high score indicates frequent occurrence of negative automatic thoughts. The ATQ contains four sub-scales of personal maladjustment (scores can range from 4 to 20) and desire for change (scores can range from 7 to 35), negative self-concept and negative expectations (scores can range from 2 to 10), low self-esteem and giving up/helplessness (scores can range from 2 to 10). Table 9 (on the next page) presents mean and standard deviations for scores on the Automatic Thoughts Questionnaire and its four sub-scales in the symptomatic and non-symptomatic groups. The first two columns represent the range and mean scores for symptomatic participants. The total ATQ scores range from 30.00 to 73.00. Personal maladjustment and desire for change scores range from 5.00 to 14.00, negative self-concept and negative expectations from 7.00 to 19.00, low self-esteem from 2.00 to 4.00, giving up/helplessness from 2.00 to 6.00.

Table 9: Mean and standard deviation scores on Automatic Thoughts Questionnaire and its four sub-scales in the symptomatic and non-symptomatic groups

	Symptomatic		Non-Symptomatic	
	Mean	Std. Deviation	Mean	Std. Deviation
Pre mood induction				
Automatic thoughts (total score)	48.05	8.74	39.58	6.88
Personal maladjustment and desire for change	8.85	2.03	7.54	2.02
Negative self-concept and negative expectations	10.60	2.76	8.65	1.74
Low self-esteem	2.25	0.64	2.21	0.54
Giving up/helplessness	3.20	1.11	2.31	0.61
Post mood induction				
Automatic thoughts (total score)	47.10	10.48	40.40	8.21
Personal maladjustment and desire for change	8.84	2.27	7.52	2.21
Negative self-concept and negative expectations	10.47	2.65	8.79	1.93
Low self-esteem	2.32	0.58	2.13	0.40
Giving up/helplessness	3.21	1.03	2.54	0.80

Table 9 also presents the range and means for non-symptomatic participants in the last two columns. The total ATQ scores range from 30.00 to 61.00. Personal maladjustment and desire for change scores range from 5.00 to 14.00, negative self-concept and negative expectations from 7.00 to 16.00, low self-esteem from 2.00 to 4.00, giving up/helplessness from 2.00 to 5.00. There is a good range demonstrated on all the self-rated measures obtained from the participants on the Automatic Thoughts Questionnaire.

3.3.2 Inferential analysis

The Statistical Package for the Social Sciences was used for the analysis. The completed pre- and post-tests included the participating number which allowed for matching individual pre- and post-tests. Once matched and recorded, a test of difference was performed on the data to determine if the participant responses changed from pre to post in a statistically significant manner. The paired sample

t-test was appropriately used if the data did not differ significantly from a normal distribution. Normality was determined using the Kolmogorov-Smirnov test of normality and the Shapiro-Wilk test. If the data did differ significantly from the normal distribution, the Wilcoxon Signed Ranks test was used. A power calculation was conducted on GPOWER, a general power analysis program (Erdfelder et al., 1996). A non symptomatic sample size of 52 and a symptomatic sample size of 21, with alpha level set at $p = 0.05$, a large effect size ($r = 0.5$), gives 99% and 82% power respectively to detect real difference due to treatment effect rather than chance.

3.3.3 Mood state manipulation check

The UWIST-MACL was used for subjective evaluation in this study, both as a general indicator of mood state and, more specifically, to evaluate changes in energetic arousal, tense arousal, hedonic tone and anger/frustration. Lowered energetic arousal equals less active and alert. Increased tense arousal is consistent with being more anxious and nervous. Lowered hedonic tone equals loss of interest and diminished pleasure response. Increased anger/frustration is consistent with more emotional feelings of anger and frustration. Table 10 reports 'mood manipulation check' for mood induction procedure for each of the four predictor variables and as so only reports the effect of mood manipulation for overall sample. The separate analysis is reserved for explanatory variables between predictor mood component variables and their effects on each outcome variable on the cue autobiographical memories. Table 10 (on the next page) presents paired t-tests in the predictor variables on the UWIST-MACL and sub-scales.

Table 10: Paired sample t-tests in the predictor variables on the UWIST-MACL

	Pre mood induction		Post mood induction			
	Mean	Std. Deviation	Mean	Std. Deviation	t (df)	Sig. (2-tailed)
Energetic arousal	19.68	2.34	20.17	2.97	-1.24 (67)	0.22
Tense arousal	19.41	2.92	19.77	3.39	-0.04 (66)	0.97
Hedonic tone	21.25	2.05	20.46	3.00	1.96 (67)	0.05*
Anger/frustration	7.29	2.74	9.22	4.15	-25.21 (72)	0.001***

*** significant at the 0.001 level (2-tailed).
** significant at the 0.01 level (2-tailed).
* significant at the 0.05 level (2-tailed).

The paired sample t-tests were also used to test the difference between pre and post mood induction scores for each sub-scale on the UWIST-MACL. There was a significant difference between pre manipulation and post manipulation mood ratings on the UWIST-MACL. The results show that hedonic tone showed a significant increase in negative mood ($t (67) = 1.96$, $p < 0.05$). This was in the expected direction. Tense arousal showed a non-significant increase in negative mood ($t (66) = -.04$, $p = .97$, n.s.). This was in the expected direction but was non-significant. The results show anger/frustration showed significant increase in negative mood ($t (72) = -25.21$, $p < 0.001$). Energetic arousal showed a non-significant reduction in negative mood ($t (67) = -1.24$, $p = .22$, n.s.). Explanation for the result observed with energetic arousal may be due to the demand placed upon participants in the procedure to complete the task within the required time parameters during the extended procedure in Study 2 compared with Study 1; i.e. energetic arousal measures activity and alertness, which may have increased slightly due to the demand place upon participants in the experimental procedure. In summary, the mood induction technique significantly increases negative mood among participants, resulting in participants being more anxious and nervous, and experiencing diminished pleasure and increased feelings of anger and frustration.

3.3.4 Paired sample t-tests on non-symptomatic and symptomatic between pre and post mood manipulation

Table 11 presents paired t-tests in the predictor variables on the cued autobiographical questionnaire and sub-scales for non-symptomatic and symptomatic groups. Hypothesis 2.2 (ii): there was a significant decrease in rumination in the non-symptomatic group following the mood induction procedure. The results demonstrate that rumination showed significant decrease in the non-symptomatic group ($t(43) = -2.11$, $p < 0.05$). The remaining t-test yielded non-significant results.

Table 11: Paired sample t-test on non-symptomatic and symptomatic between pre and post mood manipulation

Paired mean differences (Pre and post mood induction)	t	df	Sig.
Non-symptomatic			
Typical	0.96	43	0.34
Rumination	-2.11	43	0.04*
Valence	0.61	45	0.54
Other people	0.82	45	0.42
Expected	-0.56	44	0.58
Desirable	-1.09	45	0.28
Personal importance	-0.83	45	0.41
Symptomatic			
Typical	-1.42	18	0.17
Rumination	-1.25	18	0.23
Valence	0.35	18	0.73
Other people	-0.71	18	0.49
Expected	-0.86	18	0.40
Desirable	-0.15	18	0.88
Personal importance	-0.61	18	0.55

** significant at the 0.01 level (2-tailed).
* significant at the 0.05 level (2-tailed).

The second stage of analysis involved the mean and standard deviations being calculated for each cued autobiographical memory measure at pre and post mood induction. The relationship of interest in the present study is change scores between time 1 and time 2 (pre and post mood induction), so the difference

between measurements was used for the analysis. The analysis of change scores was considered important as outcome variables can be investigated over a particular treatment or manipulation (McFarland & Ryan, 2006; Shahar, 2009; Westaby et al., 2001). The cross correlations on the change scores were completed for the UWIST-MACL and CAMQ, and categorised into non-symptomatic and symptomatic in section 3.3.5.

3.3.5. Intercorrelation of change scores in specificity of appraised content in non-symptomatic and symptomatic groups

To determine the relationship between changes in mood and evaluative judgement of autobiographical memory, change scores for the UWIST-MACL and Cued Autobiographical Memory Questionnaire were calculated by subtracting participants' scores for the UWIST-MACL and participants' mean scores for Cued Autobiographical Memory Questionnaire at pre mood induction from post mood induction. Table 12 (on page 86) presents the Pearson correlation coefficients between change scores for the UWIST-MACL and Cued Autobiographical Memory Questionnaire for non-symptomatic and symptomatic.

Statistical significance was set at $p < 0.05$ and all tests were two-tailed.
Prior to the analysis, the data set was partitioned according to the participants' BDI scores. The BDI was used to classify participants as potentially symptomatic (score 8 or greater) or non-symptomatic (score 1–7). Mood state change scores (post-test minus pre-test) were calculated for each of the CAMQ sub-scales. Pearson correlation coefficients between these change scores were then conducted.

UWIST-MACL change score correlations

As expected, the correlations between the change scores on the UWIST-MACL suggest appropriate directional relationships, considering that scales on hedonic tone and energetic arousal are negatively related to the level of negative mood (low-scaled scores represent greater negative mood), whereas higher values reflect a greater negative mood on tense arousal and anger/frustration scales.

The exception was anger/frustration in the non-symptomatic, which showed an unexpected directional relationship. The scores on the correlation matrix indicate that anger/frustration for the non-symptomatic correlates positively with energetic arousal and hedonic tone. This suggests that anger/frustration decreases with increases in unpleasant and deactivated energetic arousal and unpleasant

Table 12: Intercorrelation of change scores on the UWIST-MACL (Mood) and CAMQ (Cued Autobiographical Memory Questionnaire) for non-symptomatic and symptomatic

		EA Energetic Arousal	TA Tense Arousal	HT Hedonic Tone	AF Anger/ Frustration	T-T Typical-ness	R-R Rumin-ation	V-A Valence	O-P Other People	E-X Expect-ancy	D-D Desir-ability
TA	Non-symptomatic	-0.31*									
TA	Symptomatic	-0.56*									
HT	Non-symptomatic	0.29*	-0.13								
HT	Symptomatic	0.50*	-0.14								
AF	Non-symptomatic	0.20	-0.07	0.03							
AF	Symptomatic	-0.12	-0.18	-0.62*							
T-T	Non-symptomatic	0.12	-0.13	0.01	-0.08						
T-T	Symptomatic	-0.10	0.13	-0.05	-0.38						
R-R	Non-symptomatic	0.21	-0.01	0.56***	0.11	0.19					
R-R	Symptomatic	-0.80***	0.41	-0.35	0.12	0.18					
V-A	Non-symptomatic	-0.26	0.12	-0.32*	0.18	-0.33*	-0.30*				
V-A	Symptomatic	0.07	0.08	-0.07	0.38	-0.55*	-0.30				
O-P	Non-symptomatic	-0.11	0.13	0.01	-0.01	0.02	0.43**	-0.08			
O-P	Symptomatic	-0.19	0.14	-0.36	0.10	-0.22	-0.10	0.21			
E-X	Non-symptomatic	-0.12	-0.07	0.34*	-0.05	0.14	0.15	-0.36*	-0.04		
E-X	Symptomatic	-0.17	-0.04	0.16	-0.22	0.46*	0.18	-0.59**	-0.15		
D-D	Non-symptomatic	0.06	-0.12	0.05	-0.12	0.31*	0.34*	-0.69***	0.32*	0.24	
D-D	Symptomatic	-0.20	-0.10	-0.08	-0.18	0.34	0.35	-0.89***	-0.16	0.64**	
I-P	Non-symptomatic	0.18	0.06	0.32*	0.22	0.34*	0.55***	-0.44**	0.26	0.18	0.56***
I-P	Symptomatic	0.13	-0.46	0.03	0.01	0.33	0.12	-0.68**	-0.23	0.58**	0.69**

Note: T-A =Typicalness, R-R = Rumination, V-A = Valence, O-P = Other People, E-X = Expectancy, D-D = Desirability, I-P = Importance

*** Correlation is significant at the 0.001 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

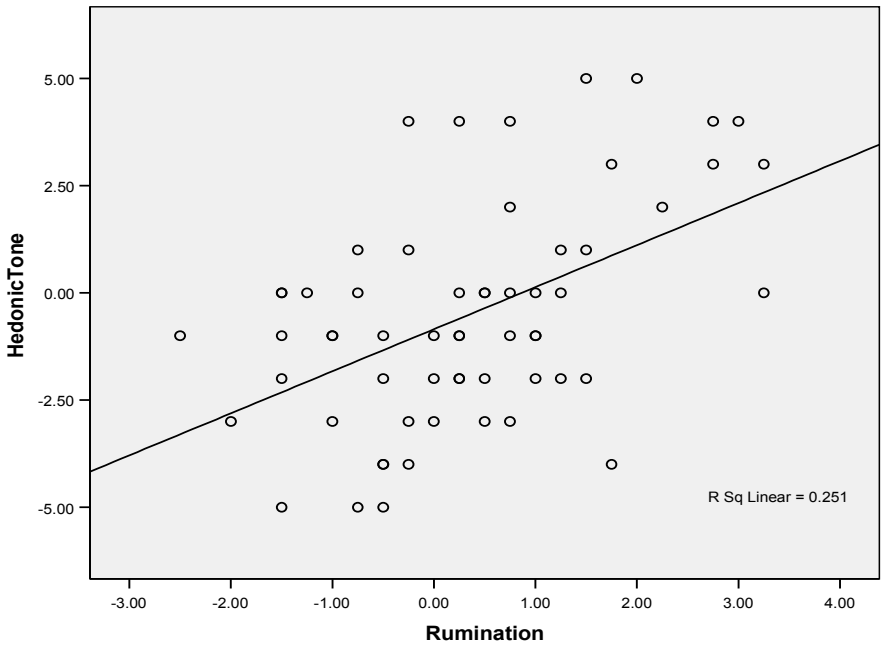
hedonic tone. Anger/frustration correlated negatively with tense arousal, suggesting that anger/frustration decreases with increases in activated and unpleasant tense arousal. These unexpected and interesting correlations might suggest an interesting mood shift in anger/frustration amongst the non-symptomatic group when confronted by unpleasant and uncomfortable mood shifts.

UWIST-MACL and CAMQ change score correlations

The correlations between the change scores on the UWIST-MACL and CAMQ for non-symptomatic are presented in the first row then alternate rows in Table 12.

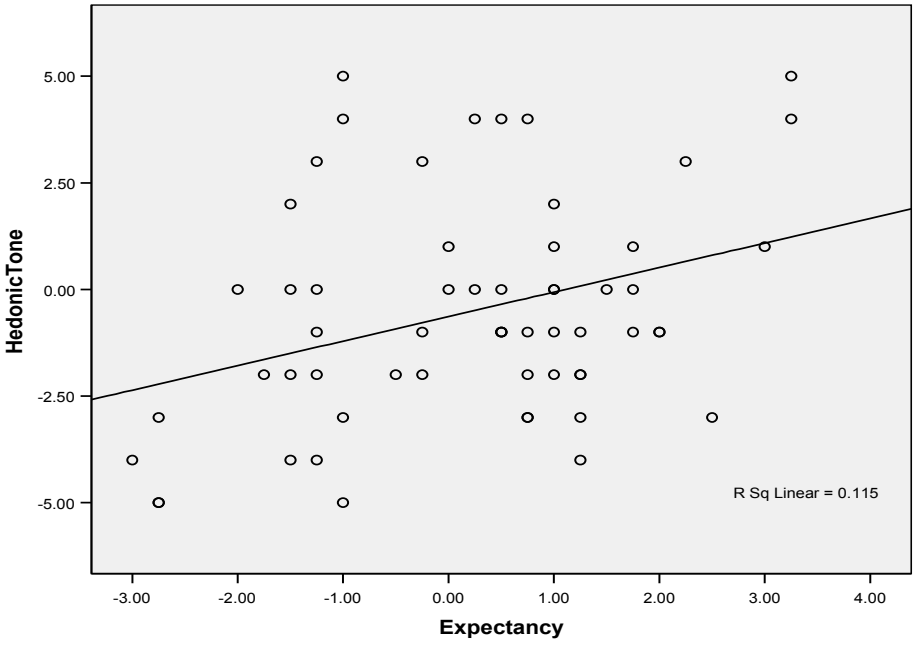
Hypothesis 2.1 (ii): There was a significant positive correlation between hedonic tone and rumination ($r = .56$, $p < 0.001$ see Graph 3). This means that as a person's negative mood increased, the amount of rumination about the autobiographical event decreased i.e. the event was thought about less often.

Graph 3: Scatter plot for change scores between hedonic tone and rumination



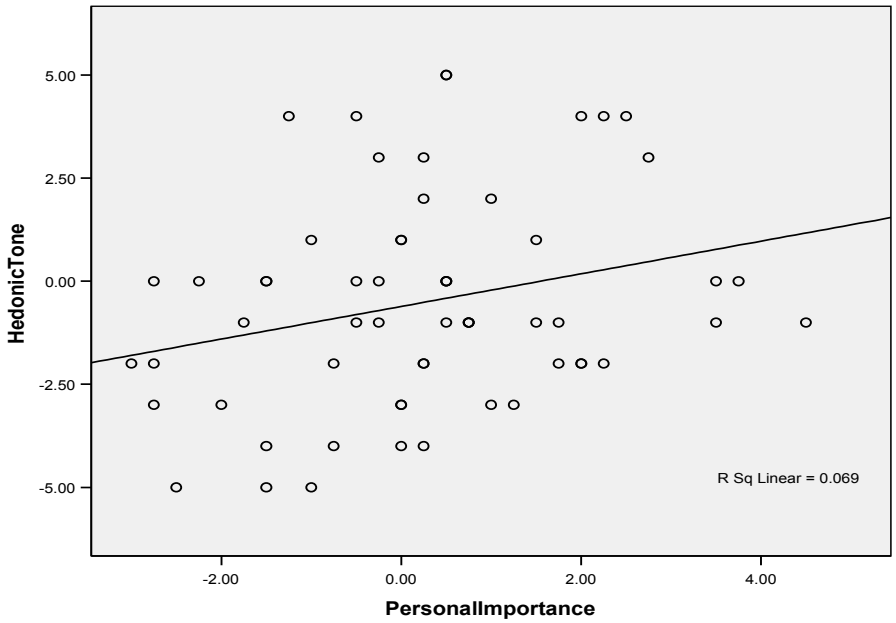
Hypothesis 2.1(iv): There was a significant positive correlation between hedonic tone and expectancy ($r = .34$, $p < 0.05$ see Graph 4). This means that as a person's negative mood increased, the expectancy of the cued autobiographical event decreased i.e. the event was less expected. It is noted that the t-test for expectancy was non-significant. Nevertheless the present analysis reports the inter-correlation between an individual mood component and expectancy as a separate explanatory change score inter-correlation, between an individual predictor variable and outcome variable.

Graph 4: Scatter plot for change scores between hedonic tone and expectancy



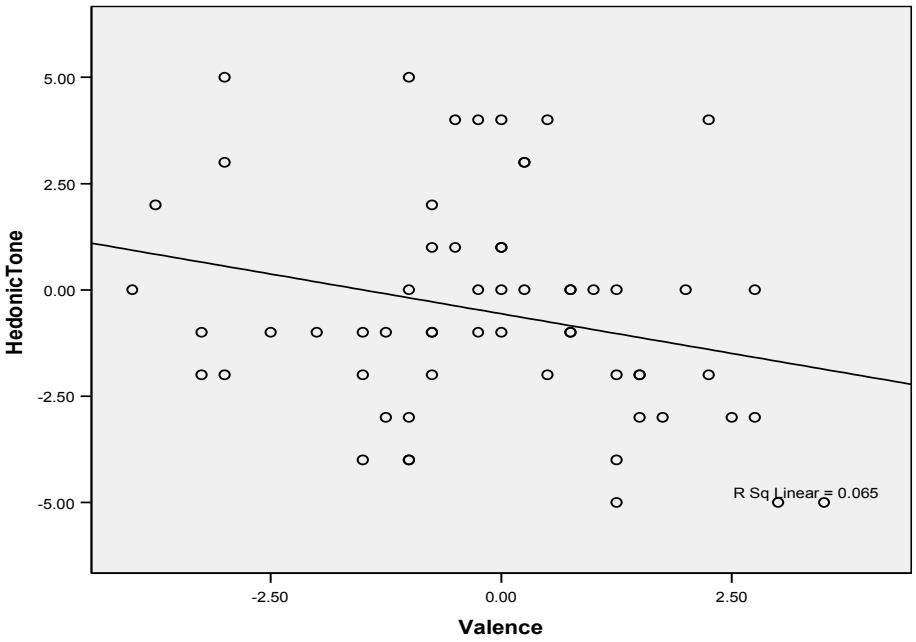
Hypothesis 2.1 (v): There was a significant positive correlation between hedonic tone and personal importance ($r = .32$, $p < 0.05$ see Graph 5 on the next page). This means that as a person's negative mood increased, the personal importance of the event decreased i.e. the event became less important. It is noted that the t-test for personal importance was non-significant. Nevertheless the present analysis reports the inter-correlation between an individual mood component and personal importance as a separate explanatory change score inter-correlation, between an individual predictor variable and outcome variable.

Graph 5: Scatter plot for change scores between hedonic tone and personal importance



Hypothesis 2.1 (vii): A significant negative correlation was found between hedonic tone and valence ($r = -.32$, $p < 0.05$ see Graph 6 on the next page). This means that as a person's negative mood increased, the valence of the cued autobiographical event increased i.e. the more positive the event. It is noted that the t-test for valence was non-significant. Nevertheless the present analysis reports the inter-correlation between an individual mood component and valence as a separate explanatory change score inter-correlation, between an individual predictor variable and outcome variable.

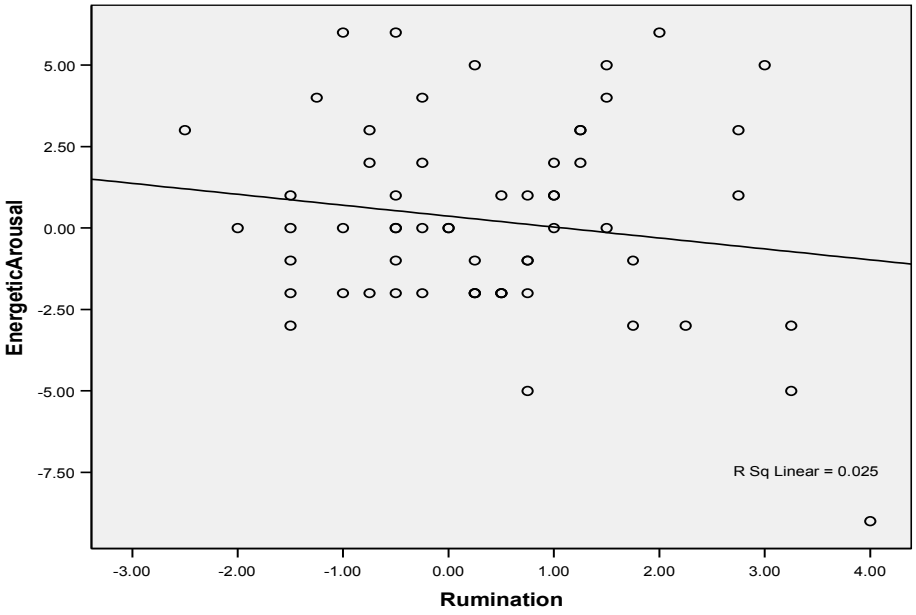
Graph 6: Scatter plot for change scores between hedonic tone and valence



The correlations between the change scores on the UWIST-MACL and CAMQ for symptomatic participants are presented in the second row and then alternate rows in Table 12.

Hypothesis 2.1 (ii): There was a significant negative correlation between energetic arousal and rumination reported on the autobiographical event ($r = -0.8$, $p < 0.001$ see Graph 7on the next page). The change score correlation is significant for these two variables suggesting a correlation exists and is supported by the scatter plot in Graph 7. This means that, as a person's energetic arousal decreased with negative mood (i.e. reverse scoring on the UWIST-MACL), the amount of rumination increased significantly. It is noted that the 'mood manipulation check' for mood induction procedure for energetic arousal was non-significant. Nevertheless the present analysis reports the inter-correlation between energetic arousal and rumination as a separate explanatory change score inter-correlational analysis, between a predictor variable and outcome variable. This finding supports results obtained in Study 1.

Graph 7: Scatter plot for change scores between energetic arousal and rumination



The significant correlations between hedonic tone and cognitive sequelae on CAMQ were not found in the symptomatic group (Hypotheses 2.2 ii, iv, v and vii). Interestingly the results indicated that the correlation on cognitive sequelae amongst the symptomatic group were in the opposite direction, although these were non-significant. The symptomatic group appeared to demonstrate a lack of response on cognitive sequelae to the temporary mood change, as measured by hedonic tone, compared to agonistic shift in cognitive sequelae in the non-symptomatic group.

CAMQ change score correlations

The change correlations between sub-scales on CAMQ for the non-symptomatic indicated that key cognitive sequelae such as valence and rumination are affected by temporary mood change. Valence demonstrated consistent negative correlations with expectancy ($r = -0.59$, $p < 0.01$), desirability ($r = -0.89$, $p < 0.001$) and personal importance of the event ($r = -0.68$, $p < 0.01$). These indicate that as valence became more negative, there was a corresponding correlational increase in expectancy, desirability and personal importance. The counterintuitive finding of increase in desirability was unexpected, but may represent an attempt to cope with unpleasant mood shift by focusing on desirable content to protect

against negative mood shift. Rumination demonstrated significant negative correlation with valence ($r = -0.30$, $p < 0.05$), suggesting that rumination increases as valence becomes more negative. Rumination correlates significantly with personal importance ($r = 0.55$, $p < 0.001$). This means that, as a person's emotionality increases, the personal importance of the autobiographical event increases.

The change correlations between sub-scales on CAMQ for the symptomatic group indicated that key features such as valence demonstrate consistent negative correlations with expectancy ($r = -0.59$, $p < 0.01$), desirability ($r = -0.89$, $p < 0.001$) and personal importance ($r = -0.68$, $p < 0.01$). The results indicate that as valence became more negative, cognitive sequelae such as expectancy, desirability and personal importance of the event increased. The counterintuitive finding of increase in desirability was demonstrated again amongst the symptomatic group. This unexpected finding may represent an attempt to cope with unpleasant mood shift amongst both groups by focusing on desirable content to protect against negative mood shift.

The significant result between hedonic tone and CAMQ were not found in the symptomatic group. Interestingly, the results indicated that the correlation on typicalness, rumination, importance of other people and desirability was in the opposite direction. The symptomatic group appeared to be responding antagonistically to the temporary mood changes as measured by hedonic tone compared to agonistic response in the non-symptomatic group.

3.3.6.1 Post hoc examination of rumination between non-symptomatic and symptomatic groups (hedonic tone component)

The researcher was interested in the relationship between rumination as a cognitive sequelae and its correlations with the non-symptomatic and symptomatic groups. The symptomatology as measured by the BDI was significantly different between the two groups. The Pearson's correlation for rumination between these two measures was 0.56 for the non-symptomatic

group and 0.35 for the symptomatic group for Hedonic Tone. The procedure for computing a confidence interval on the difference between two independent correlations involves the construction of a Z value. The value of Z can be applied to assess the significance of the difference between two correlation coefficients. The Z values with corresponding correlations and a p-value are produced in Table 13a.

Table 13a: Difference between non-symptomatic and symptomatic Pearson's r correlations on rumination (hedonic tone component)

R1 Pearson's r (non-symptomatic)	**N1** (non-sympto-matic)	**R2** Pearson's r (sympo-matic)	**N2** (sympto-matic)	**Zf1** (non-symptom-matic)	**Zf2** (sympto-matic)	**Z**	**p**
0.56	43	-0.35	17	0.63	-0.36	3.20	0.001

$Z = 3.20$ $p < 0.001$

Hypothesis 2.2 (ii): there was a significant difference on rumination between non-symptomatic and symptomatic groups ($Z = 3.20$ $p < 0.001$), with the non-symptomatic group showing a significant decrease in rumination and the symptomatic group showing a non-significant increase in rumination.

3.3.6.2 Post hoc examination of rumination between non-symptomatic and symptomatic groups (energetic arousal component)

The researcher was interested in the relationship between rumination as a cognitive sequelae and its correlations with the non-symptomatic and symptomatic groups. The symptomatology as measured by the BDI was significantly different between the two groups. The Pearson's correlation for rumination between these two measures was 0.21 for the non-symptomatic group and -0.80 for the symptomatic group for Energetic Arousal. The procedure for computing a confidence interval on the difference between two independent correlations involves the construction of a Z value. The value of Z can be applied to assess the significance of the difference between two correlation coefficients. The Z values with corresponding correlations and a p-value are produced in Table 13b (on the next page).

Table 13b: Difference between non-symptomatic and symptomatic Pearson's r correlations on rumination (energetic arousal component)

R1 Pearson's r (non-symptomatic)	**N1** (non-sympto-matic)	**R2** Pearson's r (sympo-matic)	**N2** (sympto-matic)	**Zf1** (non-symptom-matic)	**Zf2** (sympto-matic)	**Z**	**p**
0.21	43	-0.80	16	0.21	-0.10	-4.09	0.001

$Z = -4.09$ $p < 0.001$

Hypothesis 2.2 (ii): there was a significant difference on rumination between non-symptomatic and symptomatic groups ($Z = -4.09$ $p < 0.001$), with the non-symptomatic group showing a non-significant decrease in rumination and the symptomatic group showing a significant increase in rumination.

3.3.7 Intercorrelation of change scores in the four sub-scales on the UWIST-MACL and the Automatic Thoughts Questionnaire and its four sub-scales

The Automatic Thoughts Questionnaire (ATQ) was used to assess frequency of automatic thoughts (Hollon & Kendall, 1980). It is an instrument designed to identify and measure the frequency of automatic thoughts associated with depression. Table 14 (on the next page) presents the Pearson correlation between the UWIST-MACL and Automatic Thoughts Questionnaire and sub-scales. Statistical significance was set at $p < 0.05$ and all tests were two-tailed.

UWIST-MACL change score correlations

As expected, the correlations between the change scores on the UWIST-MACL suggest appropriate directional relationships, considering that scales on hedonic tone and energetic arousal are negatively related to the level of negative mood (low-scaled scores represent greater negative mood), whereas higher values reflect a greater negative mood on tense arousal and anger/frustration scales.

Table 14: Intercorrelations of change scores in the four sub-scales on the UWIST-MACL and the Automatic Thoughts Questionnaire and its four sub-scales

	EA Energetic Arousal	TA Tense Arousal	HT Hedoinc Tone	AF Anger/ Frustration	ATQ Automatic Thoughts Questionnaire	PMD Personal maladjustment and desire for change	SCE Negative self-concept and negative expectations	LSE Low self-esteem	GUH= Giving up/ helpless-ness
EA									
TA	-0.42***								
HT	0.43***	-0.15							
AF	0.02	-0.11	-0.29*						
ATQ	0.31*	-0.07	-0.01	0.35**					
PMD	0.35**	-0.24*	-0.06	0.40***	0.76***				
SCE	0.05	0.02	-0.04	0.30*	0.73***	0.38***			
LSE	0.08	0.04	-0.14	0.25*	0.52***	0.51***	0.37**		
GUH	0.11	-0.02	0.07	0.15	0.59***	0.35**	0.39***	0.31**	-

Note: ATQ = Automatic Thoughts Questionnaire, PMD = Personal maladjustment and desire for change, SCE = Negative self-concept and negative expectations, LSE = Low self-esteem, GUH = Giving up/helplessness,

*** Correlation is significant at the 0.001 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

UWIST-MACL and ATQ change score correlations

The correlations between the change scores between the UWIST-MACL and ATQ are shown in Table 14.

Hypothesis 2.3: there were significant correlations between the UWIST-MACL and ATQ. Anger/frustration, which demonstrated a significant increase in negative mood, showed significant positive correlations with the Automatic Thoughts Questionnaire ($r = 0.35$, $p < 0.01$), personal maladjustment and desire for change ($r = 0.40$, $p < 0.001$), negative self-concept and negative expectations ($r = 0.30$, $p < 0.05$) and low self-esteem ($r = 0.25$, $p < 0.05$). This means that, as a person's negative mood increased, the amount of automatic thoughts, personal maladjustment and desire for change, negative self-concept and negative expectations and negative self-esteem increased.

There was a significant positive correlation between energetic arousal and ATQ ($r = 0.31$, $p < 0.05$) and energetic arousal and personal maladjustment and desire for change ($r = 0.35$, $p < 0.01$). Tense arousal demonstrated a significant negative correlation with personal maladjustment and desire for change ($r = -0.24$, $p < 0.05$). All other inter-correlations between the four UWIST-MACL mood sub-scales and ATQ and its four sub-scales were non significant.

ATQ change score intercorrelations

The change score correlations between sub-scales on the Automatic Thoughts Questionnaire indicated significant positive correlations in the expected direction between all sub-scales: personal maladjustment and desire for change, negative self-concept and negative expectations, low self-esteem and giving up/ helplessness.

To summarise, the pair samples t-tests indicated no overall significant difference between pre and post mood induction. The one exception was rumination in the non-symptomatic group, which showed a significant decrease. The main relationship of interest in the present study was the change scores between time

1 and time 2, which yield a greater number of significant results. With the exception of rumination and energetic arousal, the change score correlations showed an overall responsiveness of cognitive reactivity in the non-symptomatic group compared with the overall non-reactivity in the symptomatic group. This suggests that negative mood may be influencing the evaluative appraisals of cued autobiographical memory retrieval. A decrease in energetic arousal is where adjectives such as 'passive', 'sluggish', 'unenterprising' and 'tired' are being endorsed, while 'energetic', 'alert', 'vigorous' and 'active' are not being endorsed. There was a significant negative correlation between energetic arousal and rumination which indicates a significant increase in rumination (remembering the directional relationship that exists between the mood component and the cognitive characteristic; energetic arousal is negatively related to the level of negative mood). The effect of reduced hedonic tone, which provides a measure of overall unpleasantness of mood and associated somatic discomfort, indicates that the non-symptomatic react to the unpleasant mood shift. This pattern was non-significant in the symptomatic group. Finally, the automatic thought questionnaire and personal maladjustment and desire for change both demonstrated significant positive correlations between energetic arousal and anger / frustration sub-scales. Negative self-concept and negative expectations and low self-esteem demonstrated correlation with anger / frustration. Also personal maladjustment and desire for change and tense arousal sub-scale demonstrated a negative correlation. It is noted that reporting significant correlations between individual mood component and automatic thoughts questionnaire and it sub scales may increase type 1 error. Nevertheless appropriate caution is taken and consideration of the non-significant correlations that existed between the four UWIST-MACL mood sub-scales and ATQ and its four sub-scales.

3.4 Discussion

The results and their interpretation are tentative in the light of the exploratory nature and the lack of correction for multiple testing. The present study was designed to explore the effects of mood manipulation on the cognitive content of

cued autobiographical memories in non-symptomatic and symptomatic groups. The results provide collaborative evidence that supports Study 1, which suggests that the mood induction procedure produces mood change, with participants showing more anxiety and nervousness, diminished pleasure and increased feelings of anger and frustration.

3.4.1 Intercorrelation of change scores showed non-reactivity in the symptomatic group

The key finding was that autobiographical content showed non-reactivity in the symptomatic compared with the increase in cognitive reactivity in the non-symptomatic group. This supports Hypothesis 2.2 that there would be a difference between the symptomatic and non-symptomatic. The one exception in the symptomatic group was the increase in rumination, which is discussed in section 3.4.2. This finding was not entirely unexpected due to the possible effects of overgeneral memory impacting negatively on autobiographical retrieval. The increase in rumination is highly related to increase in overgeneral memory (Watkins & Teasdale, 2001; Watkins, Teasdale & Williams, 2000a). This could be a possible explanation for the lack of reactivity in the symptomatic group due to the increase in overgeneral memory style negatively impacting on cognitive reactivity. By contrast, the non-symptomatic group was unaffected by an increase in rumination and subsequent negative effects on cognitive reactivity. This supports Hypothesis 2.1 that there would be a change in cognitive characteristics.

The findings support previous research on overgenerality in depressive symptomatology (Mackinger et al., 2000) but are in contrast to previous cognitive reactivity research which generally found an association between mood and cognitive content reactivity in clinically depressed groups (Timbremont & Braet, 2004). Timbremont & Braet (2004) found cognitive reactivity in those with current depression showed increased reactivity for negative self-statement words. The study criteria utilised a diagnosis of depression rather than depressive symptomatology, which may account for the discrepant findings.

There may also be some good theoretical reasons that support the present findings. The schema based cognitive theories and hierarchical search model may provide some answers. First, schema based theories (Beck, 1987; Kovacs & Beck, 1978) suggest that depressive symptomatology exerts increased cognitive load which, when combined with temporary low negative mood, increases the cognitive processing demands which may act to block autobiographical content (Williams et al., 1997). Autobiographical retrieval of past experiences requires elaborative processing and requires event-specific schema to recall event-specific information, but this is blocked due to the high demand placed upon memory and cognitive systems (Wenzlaff, Rude & West, 2002).

Second, the concept of a top-down hierarchical memory search (Williams et al., 2007) could be important to understanding the present finding. The relationship between autobiographical retrieval and symptomatic groups is thought to result in a truncated search in those with depressive symptomatology (Kleim & Ehlers, 2008). Williams et al. (2006b) argue that a truncated search occurs in those showing signs of depressive symptoms, which prevents those individuals accessing event-specific memories. This may account for the temporary negative mood shift being non-predictive in autobiographical retrieval which requires elaborative processing of information.

3.4.2 Rumination as a cognitive style was reactive to temporary negative mood state

The second key finding was that rumination showed a significant difference between non-symptomatic and symptomatic groups ($Z = 3.20$, $p < 0.001$), with the non-symptomatic group showing a significant decrease in rumination. This supports Hypothesis 2.1 ii that there would be a change in this characteristic. The findings from the present research are in line with previous research which shows that there is a higher level of rumination in the symptomatic group than the non-symptomatic group under mood stress (Morrow & Nolen-Hoeksema, 1990). It also supports Hypothesis 2.2 that there would be a difference between the

symptomatic and non-symptomatic. Morrow & Nolen-Hoeksema (1990) used a sad mood induction procedure before monitoring ruminative response and found higher levels of rumination in the symptomatic individuals than the non-symptomatic. Mackinger et al. (2000) suggested that patients with depressed symptomatology have a tendency to be 'overgeneral' in recalling autobiographical events, which results in repetitive focus on present causes of current low mood.

Rumination is thought to contribute to overgeneral memory (Watkins & Teasdale, 2001; Watkins et al., 2000a) by taking up scarce processing resources (Conway & Pleydell-Pearce, 2000) and therefore stopping memory search at a lower level and preventing access to event-specific memories. The resulting effect would have important implications for cognitive aspects because overgeneral memories do not contain context-specific information relevant to the individual personal experience (Conway & Pleydell-Pearce, 2000). Individuals affected are unable to access a record of past specific experiences that would help with current mood state and instigate appropriate cognitive strategies to address the mood state (Williams et al., 2006b). Williams, Barnhofer, Crane, Herman, Raes, Watkins & Dagleish (2007) called this 'mnemonic interlock', whereby the individual retrieval process remains at the general level and locks the individual into successive unsuccessful attempts at gaining access to specific memories.

The present study considered depressive symptomatology that was present prior to the negative mood induction. The finding suggested that participants with current symptomatology prior to the mood induction had increased ruminative style post negative mood induction. This is in keeping with previous research which suggests that the effect of mood state on memory recall is linked to dispositional attributes such as depressive symptomatology, but additionally necessitates temporary shift in negative mood (Beck, 1976; Beck et al., 1986), making it consistent with the prediction that temporary mood shifts would have little effect in the absence of stable depressive symptomatology (Beck et al, 1979).

3.4.3 Intercorrelation of change scores showed reactivity in the non-symptomatology group

An important finding from this study suggests that negative mood, as measured by hedonic tone, may be acting as a significant predictor of autobiographical content in the non-symptomatic group. The key significant changes were in autobiographical appraisals of rumination, expectancy and personal importance, which all showed significant positive correlations with hedonic tone, suggesting a reduction in all three characteristics. This supports Hypotheses 2.1 ii, iv and v that there would be a change in these characteristics. This finding concurs with the empirical finding of Lyubomirsky, Tucker, Caldwell & Berg (1999), which suggested that non-symptomatic individuals rated their ruminative thoughts as significantly more positive, optimistic and less personally related.

Valence showed a negative correlation, demonstrating an increase in positive memories with increased hedonic tone. This supports Hypothesis 2.1 vii that there would be a change in this characteristic. The present finding is similar to Wisco & Nolen Hoeksema (2009) which demonstrated a difference in valence of memories between symptomatic and non-symptomatic individuals under mood stress. The non-symptomatic individuals reported less negatively valenced memories than the symptomatic. This supports theoretical and empirical data that non-symptomatic individuals have greater access to positive memories than symptomatic individuals (Nolen-Hoeksema, Wisco & Lyubomirsky, 2008). The results are consistent and could provide support for the Bower's associative network theory, which indicates that negative shifts in mood would result in shifts in cognitive appraisals (Bower, 1981).

The results are consistent with theory of a hierarchical search that results in access to specific event memories being more likely in non-symptomatic individuals (Williams et al., 2006b). It is suggested that positively valenced memories, which are high in sensory and perceptual detail, are being accessed over negatively valenced memories by the non-symptomatic. This supports

hypotheses 2.1 vii and 2.2 that there would be a difference between the symptomatic and the non-symptomatic. The evidence suggests that healthy individuals will tend to select memories that are pleasurable and select against those that are unpleasurable (Westen, Mudserrisoglu, Fowler, Shedler & Koren, 1997). Furthermore, it is because of the frequency of rehearsal of pleasant memories compared to negatively valenced memories in non-symptomatic individuals that the former positively valenced memories are likely to be recalled (Williams et al., 2007). Overall, the findings in this section suggest that, in the non-symptomatic group, temporary mood state could be showing helpful cognitive reactivity or be unaffected by the negative impact of increased rumination and resultant effects of overgeneral style of retrieval which have been observed in the symptomatic group.

3.4.4 Intercorrelation of change scores showed that automatic negative thoughts were reactive to temporary negative mood state

The present research also supports the notion of cognitive reactivity within the automatic thoughts level of cognition. The results from this study provide support that negative mood is possibly a good predictor of negative automatic thoughts as measured by the Automatic Thoughts Questionnaire (ATQ; Hollon & Kendall, 1980). This supports Hypothesis 2.3 that there would be a change in automatic thoughts. The ATQ is based on Beck's cognitive model, which suggests that negative thinking is a central to negative mood. This was consistent with the present results, which demonstrated that with increased negative mood, as measured by the UWIST-MACL, a greater frequency of negative automatic thoughts were reported by participants. Beck (1967) defined automatic thoughts as depressive self-statements that reflect distorted thinking patterns. Automatic thoughts are relatively accessible units for research and relatively automatic cognitive products, which are suggestive of the ways in which individuals perceive and construct their appraisals (Calvete & Connor-Smith, 2005).

It was observed that anger/frustration on the UWIST-MACL was the strongest predictor of negative automatic thoughts. Anger/frustration correlated with

personal maladjustment and desire for change, negative self concept and negative expectations, low self esteem and giving up/helplessness. Anger includes affective state, and cognitive and behavioural manifestations. Buss & Perry (1992) suggest that anger is more akin to an affective state where hostility has a more cognitive component. Although focusing on a somewhat different unit of analysis, the results suggest that cognitive content is sensitive to negative mood change.

3.4.5 Conclusion

The current study represents the first measurement of a temporary shift in negative mood in relation to depressive symptomatology and its effects on autobiographical retrieval. The present study suggests that autobiographical retrieval shows non-reactivity within the depressive symptomatology group but reactivity in the non-symptomatic group. This supports Hypothesis 2.2 that there would be a difference between the symptomatic and non-symptomatic. Increased rumination is shown in the symptomatic group and automatic thoughts show significant reactivity to mood state. The content within autobiographical memory, which may be less automatic and implicit than a measure of automatic thoughts, could indicate that autobiographical memory retrieval is a more effortful and more multi-faceted phenomenon. Taken together, the findings suggest that depressive symptomatology and negative shifts in mood state are two factors involved in autobiographical content retrieval. Furthermore, results suggest that some aspects of autobiographical retrieval seem to be related to temporary mood state and some to depressive symptomatology.

The affective prime did result in changes on endorsements of autobiographical cognitive content. Autobiographical technique showed that mood induction could cue significant changes in autobiographical appraisals of rumination, expectancy and personal importance, which all showed significant positive correlations with hedonic tone in the non-symptomatic group (supporting Hypothesis 2.1 ii, iv, v and vii). Valence showed a negative correlation, demonstrating an increase in positive memories with increased hedonic tone. This supports theoretical and

empirical data that non-symptomatic individuals have greater access to positive memories than symptomatic individuals (Nolen-Hoeksema et al., 2008). The present study supports Bower's (Bower, 1981) associative network model and the Teasdale & Barnard (1993) Interactive sub-systems framework, which suggest that accessibility to cognitive content is more reactive to mood changes than the more ephemeral sensory and affective appraisals that were observed in Study 1. This might explain why the resultant correlations were more frequent and robust in the present study.

The findings from the present study suggest that rumination showed a significant change score intercorrelation with energetic arousal, indicating an increase in rumination within the symptomatic group. This supports hypotheses 2.1 ii and 2.2 that there would be a difference between the symptomatic and non-symptomatic. The findings are in line with previous research which shows there is a higher level of rumination in the symptomatic group than the non-symptomatic group under mood stress (Morrow & Nolen-Hoeksema, 1990). The results are necessarily tentative due to the smaller sample size in the symptomatic group. The comparison of correlation coefficients between symptomatic and non symptomatic did provide evidence that rumination scores were statistically significant on rumination and provided sufficient statistical power to detect a difference. The present study considered depressive symptomatology that was dispositionally present, which was linked to ruminative style when in temporary negative mood state. This is in keeping with previous research which suggests that the effects of overgenerality of memory recall are linked to dispositional attributes such as depressive symptomatology, but necessitate a temporary shift in negative mood to instigate latent cognitive styles (Beck et al., 1986).

The present study supports hypotheses 2.1 ii, iv, v and vii that a temporary negative mood state in the non-symptomatic group showed significant cognitive reactivity resulting in a change in rumination (i.e. decrease), expectancy (i.e. decrease) and personal importance (i.e. decrease), and a change in valence (i.e. increase) with increased hedonic tone. It is not known if this is a direct

consequence of negative mood or represents a lack of the presence of depression symptomatology or any other third variable. This is consistent with top-down hierarchical search from semantic, categorical to specific memories. Negative mood is proposed to result in a truncated search, in which individuals prematurely abandon their search at a higher, less specific stage containing overgeneral memory and ruminative style (Williams et al., 2006b). This seems to explain the finding within the symptomatic group, which showed increased overgenerality and increased rumination when change correlation was paired with energetic arousal. By contrast, the non-symptomatic group showed decreased rumination and increased cognitive reactivity by virtue of event-specific memory being accessed rather than latent cognitive styles being activated by negative mood.

In summary, the evidence from this study and its limitations suggested that it could prove fruitful to examine cognitive content within the retrieved autobiographical memories in the vulnerable and non-vulnerable to explore whether the findings are antecedent or scar of a previous episode of depression or temporary negative mood state. It can be expected that cognitive content might be more readily available in those with a previous episode of depression than those without, due to the longitudinal propagation of latent cognitive styles. This is consequently addressed in the next study.

CHAPTER 4

STUDY 3: Autobiographical memory responsiveness to an induced negative mood state: Cognitive appraisals in vulnerable and non-vulnerable students.

4.1 Introduction

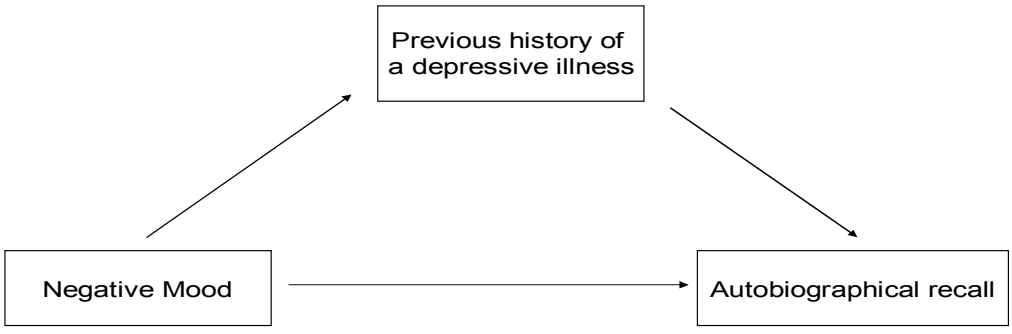
Study 2 found that autobiographical retrieval showed an overall diffuse and non-reactive response to negative mood state in those showing some depressive symptomatology. The overall autobiographical content in the symptomatic group was more diffuse (i.e. undifferentiated) in negative mood state than the non-symptomatic group which may indicate an overgeneral retrieval style. There was one notable cognitive style that did show cognitive reactivity, rumination, which showed an increase in the symptomatic group when looking at energetic arousal and rumination (see Table 12). The change score correlation is significant for these two variables suggesting a correlation exists and is supported by the scatter plot for the symptomatic (see Graph 7). The analysis reports the inter-correlation between energetic arousal and rumination as a separate explanatory change score inter-correlational analysis, between a predictor variable and outcome variable. Interestingly cognitive reactivity to mood state was shown in the non-symptomatic group, indicating a non-diffuse response. These key findings suggest that depressive symptomatology and negative shifts in mood state are two factors involved in autobiographical content retrieval.

Consequently, the present study builds on this initial evidence for low mood affecting autobiographical retrieval by further examining whether the cognitive products following a negative mood induction procedure are sensitive to mood change in those with and without a previous history of a depressive illness. This is important, as current depressive symptomatology was seen to affect autobiographical memory in Study 2 and depressive history is a known relapse marker (Segal, Williams & Teasdale, 2002) and studies suggest autobiographical memory is affected in those with a history (Miranda et al., 1998; Miranda &

Persons, 1998). Those with a history of a depressive illness show limited access to event-specific memories and may show some specific cognitive reactivity compared with those with no previous depressive history (Miranda et al., 1998; Miranda & Persons, 1998).

The literature indicates that depressive history is a known relapse marker (Segal et al., 2002) and might represent a possible moderating factor in mood state effects on autobiographical recall (Miranda et al., 1998). The literature suggests that moderating factors might be activated by temporary mood state (Miranda et al., 1998; Miranda & Persons, 1998). Previous history was operationally defined as a moderator variable as it might be helpful in explaining the strength of the relationship that exists between mood and cued autobiographical memory. To date, however, little research has investigated the effects of mood state and moderating factors on cued autobiographical content. Therefore, the present study turns its attention to depressive vulnerability, a trait factor that might be implicated in mood state effects on autobiographical recall. Figure 5 shows the potential for depressive vulnerability acting as a moderator on mood state affecting autobiographical recall.

Figure 5: Previous history of depressive illness as a moderator



The distinction between vulnerable and non-vulnerable by virtue of a previous history was also investigated by looking at autobiographical memories at the time of the event and looking back on the event to further elucidate the effect a previous history of depression might have on autobiographical memory. Previous studies suggest that a history of depression affects present and past evaluations of autobiographical memories (Yang & Rehm, 1993). In the present study the researcher sought to add to the literature by looking at the effects of a history of depression and negative mood.

4.1.1 Theoretical background

There is some evidence which indicates that vulnerability to depression is sufficient for bias cognitive styles to be visible, while other findings suggest that, in addition to vulnerability, low mood is a necessary condition to trigger certain cognitive styles (Miranda et al., 1998; Miranda & Persons, 1998). Kuyken & Dalgleish (1995) looked at those who were vulnerable to depression by virtue of previous episodes and those individuals with no previous episodes. Their findings suggested that there were no differences in overgeneral memory between the vulnerable and non-vulnerable groups. The Kuyken & Dalgleish (1995) study was in the absence of current induced negative mood, which could possibly account for absence of difference between the vulnerable and non-vulnerable.

Beck's (Beck, 1976; Beck et al., 1986) cognitive model suggests that schemas are trait-like and play a role in instigating future depressive episodes. The Beckian model suggests that the presence of cognitive bias should be apparent in people who later go on to develop depression (Beck, 1976). It also suggests that certain cognitive characteristics are not only displayed when depressed but remain even when the depressive symptoms are in remission (Lewinsohn, Steinmetz, Larson & Franklin, 1981). This vulnerability theory suggests that previous episodes of depression predispose a person to developing future episodes. The argument suggests that negative thoughts that have developed through previous episodes can lead to future depressed mood, which increases

the activation of negative schema, which in turn leads to more negative automatic thoughts and greater negative mood (Beck, 1976).

However, the longitudinal study of 998 people by Lewinsohn et al. (1981) suggested that people who were depressed showed negative cognitive bias, but people who went on to become depressed did not show negative cognitive bias prior to a depressive episode. The research by Lewinsohn et al. (1981) poses a problem for the Beckian model by showing there is an absence of predisposing negative schema prior to depressed mood. Teasdale's (Teasdale & Dent, 1987; Dent & Teasdale, 1988) differential activation hypothesis circumvents this problem by suggesting that negative schemata are activated by negative mood and not necessarily by depressed mood.

Depression and negative moods are closely linked but are not necessarily the same. Negative mood is dominated by high tense arousal with other components of mood such as anger / frustration being raised and corresponding low levels of energetic arousal and hedonic tone and is predominantly seen as a short-lived response to everyday stressors. Whereas depressed mood is predominantly seen as longer in duration and dominated by low hedonic tone and associated with low levels of energetic arousal and combined with high levels of tense arousal and anger/frustration (Matthews & Southall, 1991). Depressed mood can be seen as more stable and has greater global impact on the individuals mood (Baas, Dreu & Nijstand, 2008). The induction of a sad mood seems to facilitate or primes negative cognitive styles. Dent & Teasdale (1988) studied previously depressed and never depressed individuals and induced dysphoric and neutral mood, and found that the previously depressed individuals demonstrated stronger activation of negative self schema. The observation by Dent & Teasdale (1988) suggests that mood primes or facilitates certain cognitive styles in the previously depressed but doesn't seem to work for the never depressed individuals, which supports the 'differential activation' hypothesis.

Vulnerability effects can be demonstrated in a negative mood state (Dent & Teasdale, 1988; Miranda and Persons, 1988; Teasdale and Dent, 1987). Studies such as Miranda & Persons (1988) & Roberts & Kassel (1996) suggest that cognitive style is related to mood in vulnerable individuals but not in the non-vulnerable groups. These findings are further supported by the fact that dysfunctional attitudes can predict future depression when measured following a negative mood induction (Segal et al., 1999). However, the interpretation of these findings is somewhat difficult because they could indicate either that low mood triggers negative cognitive styles, or that negative cognitive styles trigger low mood. Miranda & Persons (1998) did test the hypothesis that latent negative cognitions are present in vulnerable individuals but need low mood to activate these cognitive styles, and found evidence to support the hypothesis.

4.1.2 Self-regulatory cognitive styles

There is another explanation that regulates cognitive content, not by mood state activating certain cognitive styles or increasing overgeneral memory retrieval, but activating self-regulatory coping styles. Study 2 highlights the possible interaction between the effects of overgeneral memory and its negative impact on cognitive reactivity. It was found that the mood induction possibly increased overgeneral retrieval in the depressive symptoms group. It was also tentatively suggested that the non-symptomatic group showed some helpful cognitive reactivity such as decrease rumination that could have been a self-regulatory strategy to combat negative mood state. Therefore a brief review of the literature pertaining to self-regulatory cognitive styles is briefly discussed.

The self-regulatory theory derives from cognitive models that focus on the way individuals deal with dysphoric mood and has been named self-regulatory coping strategies (Ingram, Miranda & Segal, 1998; Segal et al., 2002). Self-regulatory coping strategies research has focused more on the cognitive operations and individual ways that people deal with low mood. Cognitive operations focus on shifts in attention, rumination, self evaluation and future predictions (Hollon & Garber, 1988). For example, Wenzlaff et al. (2002) emphasize how self-

regulatory and mental control strategies may exacerbate low mood state via the 'ironic' processing hypotheses. They suggest that mental control strategies such as thought suppression, which is thought to be an adaptive response to halt descent into lower mood, inadvertently exacerbates the problem by triggering the automatic processing system to be especially alert to the negative content (Wenzlaff et al., 2002). Furthermore, Papageorgiou & Wells (2003) elaborate and suggest rumination as a coping strategy which can exacerbate low mood state by replaying negative events.

It has also been suggested by several commentators on self-regulatory coping strategies that there might be individual differences in the cognitive processes and focus of attention. Cognitive processes focus on how information is encoded, altered, combined and stored in memory (Hollon & Garber, 1988). Williams et al. (1997) argue that depression is characterised by elaborative processes that concentrate on negative self-referent information by enhancing the recall of negative material from previous past events. In contrast, Pyszczynski & Greenberg (1987) suggest that there might be a shift in attention to evaluate the current situation. To date, very little is known about the effect of mood on activating self-regulatory versus dysfunctional cognitive styles in autobiographical memory under mood stress.

4.1.3 Purpose of the study

The study to an extent is exploratory, because there is some evidence on the effects of depressed mood, but less evidence on the effects of individual negative mood components on autobiographical retrieval. This study sought to understand the effect of negative mood on cognitive content within autobiographical retrieval in those with and without a history of depressive illness. A single item question was used as a vulnerability screen (Appendix 11). This single item was used by Miranda et al., (1988) as a "proxy" for depressive vulnerability. It assumes that participants who have had a past episode of depression, have an enduring trait that is stable and empirically detectable. The limit to this was identifying vulnerability that could result as a consequence of a previous episode of

depression rather than possible separate vulnerability factors that may contribute to first episode depression. To assess the likelihood of a previous episode of depression, participants were asked (1) Have you been prescribed treatment for depression in the past or present? The single item was chosen because the item may increase the detection of a diagnosed depression that has been clinically assessed and subsequently been referred for treatment as opposed to a brief situational dysphoric mood. One item proxy screening for depressive vulnerability have been endorsed by previous researchers (McChargue & Cook, 2007).

The idea of the present study is to evoke event-specific memories by asking participants to rate the memory for present and past events on a number of characteristics. The characteristics were: typicalness, rumination, importance of other people, expectancy, personal importance, desirability and valence of the event retrieved. These characteristics represent key components of autobiographical memory in the literature, which have been introduced in section 3.1.1. These cognitive attributes have been suggested to guide appraisal and interact with current mood to influence memory search and attention (Williams et al., 1997).

To address the general aim of how mood affects autobiographical retrieval, participants rated a number of characteristics, which the individual endorsed on an analogue scale. The endorsements were then observed pre and post mood induction and observed against four dimensions of negative mood as measured by the UWIST-MACL (Matthews et al., 1990). The general aim was propagated in response to the lack of research investigating how mood affects the recalled content retrieved in autobiographical memories.

Furthermore, by examining the influence of vulnerability and its effects on accessibility of the cognitive products, both at the time of the event and looking back on the event, it is hoped to elucidate the importance of a history in the presence of temporary mood induction. As attested by the studies within the literature reviewed in section 3.1.1, the dimensions of typicalness, rumination,

importance of other people, expectancy, personal importance, desirability and valence of the event retrieved seem to be important attributes of autobiographical memories, yet there appears to be little research available to demonstrate how these variables are influenced by current negative mood and vulnerability by virtue of a history of depression.

The present study employed a non-clinical sample to examine change score intercorrelations between mood and autobiographical memory whilst examining the influence of vulnerability by virtue of a history of depression. A sample of students underwent autobiographical memory tests focusing on the memory appraisal prior to and following a negative mood induction procedure. The content held within autobiographical memory may be affected by such negative mood shifts. Interestingly, there appears to be a lack of research investigating how mood not only affects overgeneral memory, but influences the cognitive characteristics held within autobiographical memories both at the time of the event and looking back on the event.

In summary, the influence of negative mood on autobiographical memory appears to be generally consistent with the predictions for the seven characteristics in section 3.2.3; negative mood may be correlated with a change in typicalness, desirability and rumination, importance of other people, expectancy and negatively valence events. These characteristics may be more pronounced in individuals with vulnerability by virtue of a veridical history of depression. The present research investigated the correlations between dimensions of mood as measured by the UWIST-MACL and effects on both content-based attributes and memory changes on the free recall of autobiographical memories in those with and without a history of depression. The characteristics of autobiographical memory highlighted have emerged from research and opened up further questions on the effects of negative mood on autobiographical content.

The present study was designed to address two areas of uncertainty concerning mood effects on autobiographical retrieval:

(a) Is autobiographical content more reactive in those with a history of depressive illness?
(b) Is there a difference in endorsements on autobiographical memories for present and past appraisals?

From these general aims a number of specific hypotheses were developed concerning the effects of mood on autobiographical retrieval. It was hypothesised that negative mood would predict a change from pre to post mood induction in the endorsements on the Cued Autobiographical Memory Questionnaire. Specifically it was hypothesized that negative mood would predict a change in endorsements of:-

i) typicalness in cued autobiographical recall (Coluccia et al., 2006)
ii) ruminative response in cued recall (Williams et al., 2006a)
iii) negative evaluation of the importance of other people (Ryan & Deci, 2000)
iv) the ability to conceptualize and judge the likelihood of future events (Williams et al., 2006a)
v) personal importance of cued memory recall (Williams et al., 2008)
vi) desirability in cued memory recall (Ryan & Deci, 2000)
vii) valence in cued memory recall (Walker et al., 2003).

$H_{3.1}$ It was hypothesised that there would be a change from pre to post mood induction in the endorsements on the cued autobiographical memory and that there would be a difference in endorsements at the time the event occurred and looking back on the event in the past for characteristics i-vii above.

$H_{3.2}$ It was hypothesised that there would be a difference between the vulnerable and non-vulnerable endorsements for characteristics i-vii above.

$H_{3.3}$ It was hypothesised that there would be a change from pre to post mood induction in the endorsement of negative automatic thoughts as measure by the Automatic Thoughts Questionnaire.

4.2 Method

4.2.1 Participants

One hundred and four students from the University of Chester's Faculty of Health and Social Care participated in the study. Students in the present study had not participated in the previous studies. The mean age of the sample was 26.84 years, standard deviation 8.41 with a range of 18-50 years. The sample consisted of 92 female and 12 male participants. 12 participants were excluded for their own protection on the basis of their high BDI-2 score (see section 2.2.3 for ethical procedure and support offered to all participants). 27 participants self-reported a vulnerability and 77 participants reported no vulnerability to depression. A power calculation was conducted on GPOWER, a general power analysis program (Erdfelder et al., 1996). A sample size of 104, with alpha level set at $p = 0.05$, a large effect size ($r = 0.5$), gives 99% power to detect real difference due to treatment effect rather than chance.

Ethical approval was granted by the Psychology Departmental Ethics Committee prior to data collection, and ethical approval for access to students was granted from the Faculty of Health and Social Care Ethics Committee prior to recruitment of participants. The ethical guidelines and consent process was followed as in Study 2 section 3.2.1.

4.2.2 Materials & measures

Along with the mood induction procedure, the following five psychometric materials and measures were utilised in this study:

Vulnerability to Depression

The Vulnerability to Depression questionnaire (Persons & Miranda, 1992) was used as a proxy to assess vulnerability for depression. Participants were asked to self-report whether they had previously been prescribed treatment for depression symptoms, and then asked to select one or more treatments, including pharmacology, cognitive behavioural therapy and counselling. Those who had received previous treatment were considered vulnerable, and those who had not and were without a current history were classified as non-vulnerable.

Depressive Symptomatology

The Beck Depression inventory – Version 2 (Beck et al., 1996) was utilised as in Study 2. Several studies reported strong psychometric properties in student populations (Sprinkle et al., 2002; Storch et al., 2004; Whisman et al., 2000). The BDI-II has demonstrated good internal reliability, reliability and validity (alpha = .82, test-retest reliability between .65 and .72; Vazquez & Sanz, 1991).

Mood State

The University of Wales Institute of Science and Technology Mood Adjective Checklist (the UWIST-MACL; Matthews et al., 1990) was utilised as in Studies 1 & 2. The psychometric properties were identified for the UWIST-MACL and shown to have good internal reliability and validity for non clinical mood variations (Matthews et al., 1990).

Cognitive products

The Automatic Thoughts Questionnaire (ATQ; Hollon & Kendall, 1980) was utilised as in Study 2. The ATQ has the ability to differentiate between the depressed and non-depressed with a high internal consistency, alpha = .96 (Hollen & Kendall, 1980). Satisfactory psychometrics have been identified recently on the ATQ (Chioqueta & Stiles, 2004).

Cued Autobiographical Memory Questionnaire (CAMQ)

The Cued Autobiographical Memory Questionnaire (modified version AMT; Williams & Broadbent, 1986) had the inclusion of 'now' and 'then' appraisals for each of the sub-scales. The same seven retrieval prompts on the cued autobiographical questionnaire and the same four neutral cue words lists were used as in Study 2. The modified version of the Autobiographical Memory Test (AMT; Williams & Broadbent, 1986) has been widely used to assess autobiographical content and has been found to have good reliability (Williams et al., 2007).

Mood Induction

The intervention phase utilised the Velten Mood Induction Procedure (Velten, 1968) as in Studies 1 & 2. The Velten Procedure has been found to mimic the affective disturbance and behavioural attributes of depressive states (Bates et al., 1999).

4.2.3 Procedure

Following the same procedure as Study 2, the Beck's Depression Inventory BDI-II (Beck & Steer, 1993; Beck et al., 1961) was used as a screening questionnaire to assess the level of depression and screen out moderate to severely depressed students for their protection. The first addition to the procedure compared with Study 2 was that each participant was asked to self-report whether they had previously been prescribed treatment for depression symptoms as done previously by Persons & Miranda (1992). Those who had a previous treatment were considered vulnerable and those without a previous or current history non-vulnerable.

As with Study 2, groups of twenty to thirty participants at a time were asked to complete the Mood Adjective Checklist psychometric measure (the UWIST-MACL; Matthews et al., 1990). The mood measure provided the baseline mood

scores for the study and was the predictor variable. The second addition to the procedure was the adapted Cued Autobiographical Memory Questionnaire, which asked for appraisals at the time the event occurred (i.e. then) and looking back on the event (i.e. now). The cued autobiographical memory task was a modified version of the paradigm used by Williams & Broadbent (1986), in which words were provided as memory cues. Participants were asked to rate each of the four memories on a 7-point Likert scale (ranging from –3 to +3).

The same procedure was followed as detailed in Study 1 for the mood induction technique. At time point 2, the same participant group were administered the Mood Adjective Checklist measure, Automatic Thoughts Questionnaire and the cued autobiographical memory task (Word list A & B were used in rotation with each group). As with Study 1, the researcher provided debriefing and contact details for the student counselling service.

4.2.4 Design and analysis strategy

The experiment had a within subjects design. The predictor or independent variable was mood induction procedure with its effect on mood, which was measured by the mood adjective checklist and its four sub-scales (Matthews et al., 1990). The outcome variable was the autobiographical content which was measured by the Cued Autobiographical Memory Questionnaire and its variables. This study tested the accessibility of cognitive characteristics of the cued autobiographical events in vulnerable and non-vulnerable individuals. The characteristics of the event were rated at the time the event occurred (i.e. then) and looking back on the event (now). The predictor and outcome variables were defined and are listed in Table 15 (on the next page).

Table 15: List of predictor and outcome variables

Independent/predictor/ explanatory Variable (s)	Dependent/outcome Variable (s)
The University of Wales Institute of Science and Technology Mood Adjective Checklist (UWIST-MACL)	*Cued Autobiographical Memories Questionnaire (CAMQ)*
	Typicalness, Rumination, Importance of other people, Expectancy, Importance of the event for self ("Now" and "Then" ratings), Desirability and Valence
Energetic Arousal (EA)	
Tense Arousal (TA)	
Hedonic Tone (HT)	*Automatic Thoughts Questionnaire (ATQ)*
Anger/frustration (AF)	Personal Maladjustment & Desire for Change
	Negative Self-Concept & Expectations
	Low Self-Esteem and Giving Up/Helplessness

The first outcome variables were obtained from the Cued Autobiographical Memory test. Participants rated a number of cognitive characteristics such as: how typical, rumination, valence, how important were other people, expectancy, desirability and importance for self. The appraisals were rated at the time the event occurred (i.e. then) and looking back on the event (i.e. now). The second outcome variables were obtained from the Automatic Thoughts Questionnaire (ATQ). The measure was used to assess the amount and type of negative automatic thoughts. The questionnaire had four sub-scales: personal maladjustment & desire for change, negative self-concept & expectations, low self-esteem and giving up/helplessness.

The same stages in the analysis strategy were followed as detailed in study 2 section 3.2.4. The two alternations to the analysis strategy involved stage two of the analysis strategy. The present study divided participants into vulnerable and non-vulnerable rather than symptomatic and non-symptomatic as done in Study 2. The vulnerable and non-vulnerable groups were categorised as done

previously by Persons & Miranda (1992). The second alteration involved the inclusion of 'now' and 'then' appraisals as used by Yang & Rehm (1993) vis-à-vis 'present' and 'past' appraisals enabled present and past memories to be examined in vulnerable and non-vulnerable recall. The change score inter-correlations were calculated as detailed in Study 1 in section 2.2.5. Finally, the researcher did not predict the exact directional relationship but rather that a relationship did exist between mood components and cognitive content in negative mood as done in Studies 1 & 2.

4.3 Results

4.3.1 Descriptive statistics

The minimum and maximum for the UWIST-MACL sub-scales are 8 to 32 for energetic arousal, tense arousal and hedonic tone. The minimum score for anger sub-scale is 5 and the maximum is 20. The results from the present study show a minimum score of 8 to a maximum score of 32 on the three main bipolar and 5 minimum and 20 maximum on the monopolar scale. Table 16 (on the next page) presents the means and standard deviations for scores on the UWIST-MACL sub-scales for the vulnerable and non-vulnerable groups.

The mean and standard deviation scores for vulnerable participants are in the first two columns. Scores on the hedonic tone and energetic arousal scale are negatively related to the level of negative mood (low-scaled scores represent greater negative mood), whereas higher values reflect a greater negative mood on tense arousal and anger/frustration scales. The post mood induction scores show increased negative mood on each of the four sub-scales of the UWIST-MACL.

Table 16: Means and standard deviation scores on the UWIST-MACL sub-scales pre and post mood induction for vulnerable and non-vulnerable groups

	Vulnerable		Non-vulnerable	
	Mean	Std. Deviation	Mean	Std. Deviation
Pre mood induction				
Energetic arousal	22.15	3.35	22.68	3.65
Tense arousal	15.52	4.35	14.04	3.81
Hedonic tone	26.40	3.66	27.82	3.43
Anger/frustration	8.22	2.72	7.79	3.36
Post mood induction				
Energetic arousal	18.67	4.85	20.27	4.13
Tense arousal	17.30	4.37	14.35	4.29
Hedonic tone	23.27	4.66	24.93	4.81
Anger/frustration	10.04	4.28	9.23	4.02

Table 16 also shows the mean scores for non-vulnerable participants in the last two columns. The post mood induction scores show increased negative mood on each of the four sub-scales of the UWIST-MACL. Furthermore, the mean the UWIST-MACL scores for vulnerable participants show higher values for both pre and post mood induction compared with non-vulnerable participants. It is important when looking at the UWIST-MACL values to remember that energetic arousal and hedonic tone are negatively related to the level of negative mood i.e. as hedonic tone scores go down, the level of negative mood goes up. However, tense arousal and anger/frustration are positively related to the level of negative mood i.e. as anger/frustration goes up, the level of negative mood goes up.

The next table presents the means and standard deviations for the Cued Autobiographical Questionnaire for 'past' and 'present' appraisals in the vulnerable and non-vulnerable groups (Table 17 on the next page). The minimum score was 1 and the maximum score was 7 on each of these self-rating Likert scales. The third column, starting in the first row and then alternate rows, represents the mean score over the four cued memories on each of the seven outcome variables for vulnerable participants' 'past' appraisals.

Table 17: Mean and standard deviation scores on the seven outcome measures within the Cued Autobiographical Questionnaire for 'past' and 'present' appraisals in the vulnerable and non-vulnerable groups

		Past appraisals		Present appraisals	
Characteristic	Vulnerability	Mean	Std. Deviation	Mean	Std. Deviation
Pre mood induction					
Typical	Vunerable	4.23	1.31	2.56	1.13
	Non-vulnerable	4.39	1.61	3.09	1.53
Rumination	Vunerable	4.22	1.45	3.21	1.06
	Non-vulnerable	4.93	1.34	3.47	1.40
Valence	Vunerable	4.93	1.12	4.95	1.19
	Non-vulnerable	5.18	1.32	5.07	1.28
Other people	Vunerable	5.58	1.02	5.07	1.27
	Non-vulnerable	5.50	1.37	5.31	1.42
Expected	Vunerable	4.38	1.41	4.40	1.35
	Non-vulnerable	4.32	1.64	4.34	1.64
Desirable	Vunerable	5.02	1.34	4.81	1.36
	Non-vulnerable	4.69	1.35	4.46	1.43
Personal importance	Vunerable	5.14	1.20	4.74	1.37
	Non-vulnerable	5.04	1.38	5.03	1.41
Post mood induction					
Typical	Vunerable	4.49	1.48	3.19	1.64
	Non-vulnerable	4.16	1.46	3.55	1.54
Rumination	Vunerable	4.80	1.52	3.20	1.44
	Non-vulnerable	4.81	1.30	3.77	1.50
Valence	Vunerable	4.94	1.51	5.02	1.26
	Non-vulnerable	4.75	1.53	4.87	1.44
Other people	Vunerable	5.56	1.02	5.28	1.61
	Non-vulnerable	5.46	1.52	5.37	1.52
Expected	Vunerable	4.19	1.72	4.39	1.57
	Non-vulnerable	4.38	1.53	4.46	1.62
Desirable	Vunerable	4.82	1.62	4.79	1.56
	Non-vulnerable	4.55	1.71	4.46	1.60
Personal importance	Vunerable	5.55	1.09	5.16	1.20
	Non-vulnerable	4.98	1.61	5.05	1.46

The minimum score is 1.00 and the maximum score is 7.00. Typical scores range from 1.00 to 7.00, rumination ranges from 1.00 to 7.00, valence from 1.00 to 7.00, other people from 3.00 to 7.00, expected from 1.00 to 7.00, desirable from 1.00 to 7.00 and personal importance from 2.33 to 7.00. The mean score over

the four cued memories on each of the seven outcome variables for vulnerable participants' 'present' appraisals in column five. Typical scores range from 1.00 to 6.67, rumination ranges from 1.00 to 5.67, valence from 2.50 to 7.00, other people from 1.00 to 7.00, expected from 1.00 to 7.00, desirable from 1.00 to 7.00 and personal importance from 1.67 to 7.00. There was a good range demonstrated on all the self rated measured obtained from the participants on the autobiographical questionnaire.

The means and standard deviations for the Cued Autobiographical Questionnaire for 'past' and 'present' appraisals in the non-vulnerable group are also present in columns three and five. The third column, starting in the second row and then alternate rows, represents the mean score over the four cued memories on each of the seven outcome variables for non-vulnerable participants' 'past' appraisals. The minimum score is 1.00 and the maximum score was 7.00 for each participant. Typical scores range from 1.00 to 7.00, rumination ranges from 1.00 to 7.00, valence from 1.00 to 7.00, other people from 1.00 to 7.00, expected from 1.00 to 7.00, desirable from 1.00 to 7.00 and personal importance from 1.00 to 7.00. The fifth column presents the mean score over the four cued memories on each of the seven outcome variables for non-vulnerable participants' 'present' appraisals. The minimum score is 1.00 and the maximum score is 7.00 for each participant. Typical scores range from 1.00 to 7.00, rumination ranges from 1.00 to 7.00, valence from 1.00 to 7.00, other people from 1.00 to 7.00, expected from 1.00 to 7.00, desirable from 1.00 to 7.00 and personal importance from 1.00 to 7.00. Therefore, there is a good range demonstrated on all the self-rated measures obtained from the participants on the autobiographical questionnaire.

4.3.1.1 Mean and standard deviation scores on Automatic Thoughts Questionnaire (ATQ) in the vulnerable

Scores on the ATQ can range from 30 to 150. A high score indicates frequent occurrence of negative automatic thoughts. The ATQ contains four sub-scales of personal maladjustment (scores can range from 4 to 20) and desire for change (scores can range from 7 to 35), negative self-concept and negative expectations

(scores can range from 2 to 10), low self-esteem and giving up/helplessness (scores can range from 2 to 10). Table 18 presents means and standard deviations for scores on the Automatic Thoughts Questionnaire and its four sub-scales in the vulnerable and non-vulnerable groups.

Table 18: Mean and standard deviation scores on the Automatic Thoughts Questionnaire and its four sub-scales in the vulnerable and non-vulnerable groups

	Vulnerable		**Non- vulnerable**	
	Mean	Std. Deviation	Mean	Std. Deviation
Pre mood induction				
Automatic thoughts (total score)	46.56	11.36	40.49	9.50
Personal maladjustment and desire for change	8.89	2.21	7.20	2.28
Negative self-concept and negative expectations	10.48	3.19	9.35	2.60
Low self-esteem	2.30	0.67	2.26	0.60
Giving up/helplessness	2.74	0.90	2.54	0.88
Post mood induction				
Automatic thoughts (total score)	45.42	13.62	41.03	10.85
Personal maladjustment and desire for change	8.50	2.75	7.49	2.43
Negative self-concept and negative expectations	9.96	3.34	9.21	2.96
Low self-esteem	2.35	0.98	2.32	0.76
Giving up/helplessness	2.85	1.08	2.59	1.01

The first two columns represent the mean and standard deviation scores for vulnerable participants. The total ATQ scores range from 31.00 to 87.00. Personal maladjustment and desire for change scores range from 5.00 to 17.00, negative self-concept and negative expectations from 7.00 to 22.00, low self-esteem from 2.00 to 5.00, giving up/helplessness from 2.00 to 6.00. The last two columns present the mean and standard deviation scores for non-vulnerable participants. The total ATQ scores range from 30.00 to 78.00. Personal maladjustment and desire for change scores range from 5.00 to 17.00, negative self-concept and negative expectations from 7.00 to 19.00, low self-esteem from 2.00 to 5.00, giving up/helplessness from 2.00 to 6.00. Therefore, there is a good

range demonstrated on all the self-rated measures obtained from the participants on the Automatic Thoughts Questionnaire.

4.3.2 Inferential analysis

The Statistical Package for the Social Sciences was used for the analysis. The paired samples t-test was used to test the difference between pre and post mood induction scores for each sub-scale on the UWIST-MACL. A power calculation was conducted on GPOWER, a general power analysis program (Erdfelder et al., 1996). A non vulnerable sample size of 72 and a Vulnerable sample size of 27, with alpha level set at $p = 0.05$, a large effect size ($r = 0.5$), gives 99% and 82% power respectively to detect real difference due to treatment effect rather than chance.

4.3.3.1 Manipulation check

The UWIST-MACL was used for subjective evaluation in this study, both as a general indicator of mood state and, more specifically, to evaluate changes in energetic arousal, tense arousal, hedonic tone and anger/frustration. Lowered energetic arousal equals less active and alert. Increased tense arousal is consistent with being more anxious and nervous. Lowered hedonic tone equals loss of interest and diminished pleasure response. Increased anger/frustration is consistent with more emotional feelings of anger and frustration. Table 19 reports 'mood manipulation check' for mood induction procedure for each of the four predictor variables and as so only reports the effect of mood manipulation for the overall sample. The separate analysis is reserved for explanatory variables between predictor mood component variables and their effects on each outcome variable on the cue autobiographical memories. Table 19 (on the next page) presents paired t-tests in the predictor variables on the UWIST-MACL and sub-scales.

Table 19: Paired sample t-tests in the predictor variables on the UWIST-MACL

	Pre mood induction		Post mood induction			
	Mean	Std. Deviation	Mean	Std. Deviation	t (df)	Sig. (2-tailed)
Energetic arousal	22.53	3.56	19.76	4.31	6.09 (99)	.001***
Tense arousal	14.66	3.97	15.01	4.51	-0.99 (95)	.326
Hedonic tone	27.39	3.57	24.66	4.69	5.66 (89)	.001***
Anger/frustration	7.78	3.00	9.44	4.08	-4.26 (101)	.001***

*** significant at the 0.001 level (2-tailed).
** significant at the 0.01 level (2-tailed).
* significant at the 0.05 level (2-tailed).

As expected, there was a significant difference between pre manipulation and post manipulation mood ratings on the UWIST-MACL. The results indicated that energetic arousal, hedonic tone and anger/frustration showed a significant increase in negative mood ($t(99) = 6.09$, $p < 0.001$), ($t(89) = 5.66$, $p < 0.001$) and ($t(101) = -4.26$, $p < 0.001$) respectively. Tense arousal showed a non-significant increase in negative mood ($t(95) = -.99$, $p = .326$, n.s.). This was in the expected direction but was non-significant. Explanation for the result observed with tense arousal may be due to the test-retest effect i.e. tense arousal measures anxiety which may increase less than expected with retest due to it being a more familiar task and counteracting the effects of the increase in anxiety due to the effects from the mood induction procedure.

4.3.3.2 Paired sample t-tests on the non-vulnerable and vulnerable between pre and post mood manipulation

Table 20 (on the next page) presents paired t- tests on the non-vulnerable and vulnerable for 'past' and 'present' memories in the predictor variables on the cued autobiographical questionnaire and sub-scales.

Hypothesis 3.1(vii): there was a significant increase in valence for past memories in the non-vulnerable following the mood induction procedure. The results demonstrated that valence for past memories showed a significant increase in the non-vulnerable group ($t(73) = 2.27$, $p < 0.05$). Table 20 also presents paired t- tests on the non-vulnerable and vulnerable for 'present' memories in the predictor variables on the cued autobiographical questionnaire and sub-scales.

Hypothesis 3.1(i): there was a significant decrease in typicalness in both the non-vulnerable and vulnerable groups following the mood induction procedure. The results demonstrated that typicalness showed a significant decrease in the non-vulnerable ($t(74) = -1.97$, $p < 0.05$) and vulnerable ($t(25) = -2.29$, $p < 0.05$).

Table 20: Paired sample t-tests on the non-vulnerable and vulnerable for 'past' and 'present' memories between pre and post mood manipulation

	Past		Present	
Paired mean differences (Pre and post mood induction)	**t (df)**	**Sig.**	**t (df)**	**Sig.**
Non-vulnerable				
Typical	1.00 (74)	0.32	-1.97 (74)	0.05*
Rumination	0.71 (74)	0.48	-1.57 (73)	0.12
Valence	2.27 (73)	0.03*	0.97 (74)	0.34
Other people	0.23 (74)	0.82	-0.16 (74)	0.87
Expected	-0.39 (74)	0.70	-0.64 (74)	0.53
Desirable	0.57 (74)	0.57	-0.19 (74)	0.85
Personal importance	0.39 (74)	0.70	-0.08 (74)	0.94
Vulnerable				
Typical	-0.70 (25)	0.49	-2.29 (25)	0.03*
Rumination	-1.66 (25)	0.11	0.01 (25)	0.99
Valence	-0.05 (25)	0.96	-0.29 (25)	0.77
Other people	0.06 (25)	0.95	-0.48 (25)	0.63
Expected	0.56 (25)	0.58	-0.02 (25)	0.98
Desirable	0.42 (25)	0.68	0.04 (25)	0.97
Personal importance	-1.73 (25)	0.10	-1.36 (25)	0.19

** significant at the 0.01 level (2-tailed).
* significant at the 0.05 level (2-tailed).

To summarise, the pair samples t-tests indicated no overall significant difference between pre and post mood induction procedures. The one exception was valence in the non-vulnerable group, which showed a significant increase. The second stage of analysis involved the mean and standard deviations being calculated for each cued autobiographical memory measure at pre and post mood induction. The relationship of interest in the present study was change scores between time 1 and time 2 (pre and post mood induction), so the differences between measurements was used for the analysis. The change score intercorrelations were completed for the UWIST-MACL and CAMQ and categorised into past and present memories for the vulnerable and non-vulnerable in section 4.3.3.3.

4.3.3.3 Intercorrelation of change scores in the UWIST-MACL and the Cued Autobiographical Memory Questionnaire (CAMQ) for 'present' and 'past' memories in the vulnerable and non-vulnerable groups.

Table 21 (on the next page) presents the Pearson correlation coefficients between change scores for the UWIST-MACL and the Cued Autobiographical Memory Questionnaire for 'present' and 'past' memories in the vulnerable and non-vulnerable groups. Statistical significance was set at $p < 0.05$ and all tests were two-tailed.

UWIST-MACL change score correlations: Vulnerable and non-vulnerable

As expected, the significant correlations between the change scores on the UWIST-MACL suggested appropriate directional relationships considering that scales on hedonic tone and energetic arousal are negatively related to the level of negative mood (low-scaled scores represent greater negative mood), whereas higher values reflect a greater negative mood on tense arousal and anger/ frustration scales.

UWIST-MACL and CAMQ change score intercorrelations: Vulnerable

The correlations for 'present' memories in the vulnerable are represented in Table 21 (on the next page).

Table 21: Intercorrelation of change scores in the UWIST-MACL and the Cued Autobiographical Memory Questionnaire for 'present' and 'past' memories in the vulnerable and non-vulnerable groups

		EA		TA		HT		AF		T-A		R-R		V-A		O-P		E-X		D-D	
		Present	past	Present	past	Present	past	Present	past	Present	past	Present	past	Present	past	Present	past	Present	past	Present	past
TA	Vulnerable	-0.38																			
	Non-Vulnerable	-0.18																			
HT	Vulnerable	0.77***		-0.56**																	
	Non-Vulnerable	0.66***		-0.38**																	
FA	Vulnerable	-0.24		0.19		0.00															
	Non-Vulnerable	-0.19		0.28*		-0.44***															
T-A	Vulnerable	0.21	0.26	-0.11	-0.20	0.36	0.35	0.43*	-0.24												
	Non-Vulnerable	0.23	0.14	0.07	0.02	0.12	0.23	-0.07	-0.10												
R-R	Vulnerable	-0.38	-0.06	0.09	-0.16	-0.21	-0.01	0.31	0.32	-0.20	0.24										
	Non-Vulnerable	0.05	0.03	-0.23	-0.02	0.24	0.09	-0.16	-0.12	0.01	0.44***										
V-A	Vulnerable	0.09	-0.15	-0.35	-0.43*	0.32	0.22	0.08	0.21	-0.08	0.07	0.35	0.53**								
	Non-Vulnerable	0.24*	0.15	-0.19	-0.26*	0.05	-0.04	-0.06	-0.08	0.16	0.29*	0.15	0.25*								
O-P	Vulnerable	0.14	0.16	-0.51*	-0.47*	0.41	0.43	0.00	0.05	-0.10	0.07	0.31	0.58**	0.75***	0.59**						
	Non-Vulnerable	0.14	0.11	-0.20	-0.24*	0.22	0.09	0.08	0.00	0.13	-0.02	0.29*	0.17	0.05	0.01						
E-X	Vulnerable	0.29	0.22	-0.34	-0.38	0.55**	0.51*	0.11	0.04	0.63***	0.07	-0.10	-0.06	0.31	0.19	0.33	0.29				
	Non-Vulnerable	0.19	0.23	-0.18	-0.11	0.10	0.05	-0.01	0.05	0.48***	0.10	0.08	0.00	0.19	0.24*	0.20	0.23*				
D-D	Vulnerable	-0.06	0.13	-0.19	-0.20	0.19	0.31	0.17	0.17	-0.07	-0.19	0.18	0.29	0.86***	0.58**	0.66***	0.59**	0.33	0.38		
	Non-Vulnerable	-0.04	0.11	-0.18	-0.18	-0.07	-0.04	0.09	0.05	0.25*	0.13	0.09	0.22	0.64***	0.45***	-0.03	0.07	0.40***	0.30**		
I-P	Vulnerable	-0.19	0.14	-0.19	-0.27	0.01	0.30	-0.24	0.03	-0.21	0.06	0.42*	0.45*	0.55**	0.50**	0.42*	0.56**	0.22	0.18	0.43*	0.49*
	Non-Vulnerable	0.03	0.17	-0.08	-0.17	0.15	0.24	0.05	0.01	0.00	0.33**	0.25*	0.53***	0.42***	0.25*	0.22	0.22	0.21	0.18	0.40***	0.38***

Note: T-A =Typicalness, R-R = Rumination, V-A = Valence, O-P = Other People, E-X = Expectancy, D-D = Desirability, I-P = Importance

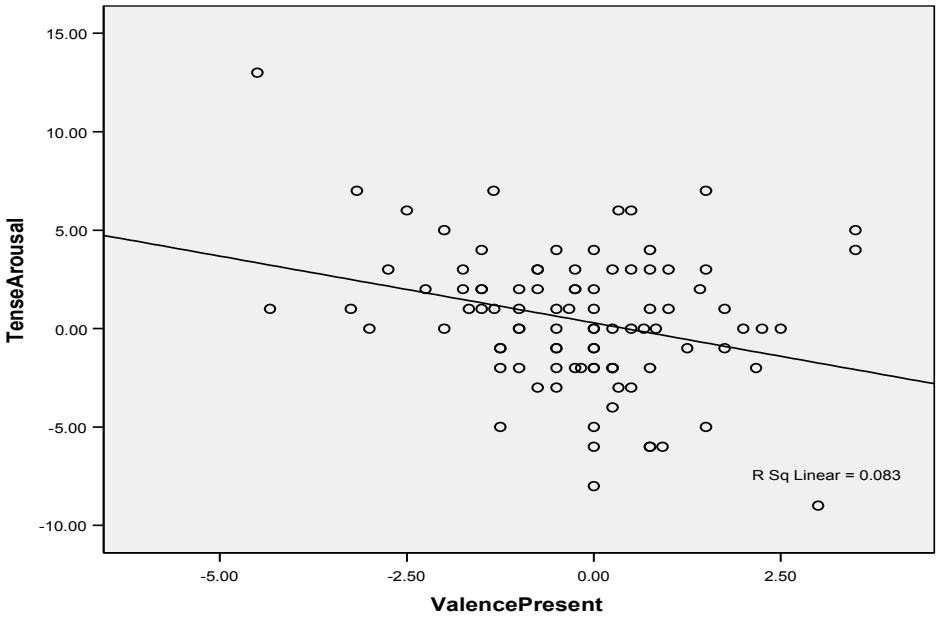
*** Correlation is significant at the 0.001 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

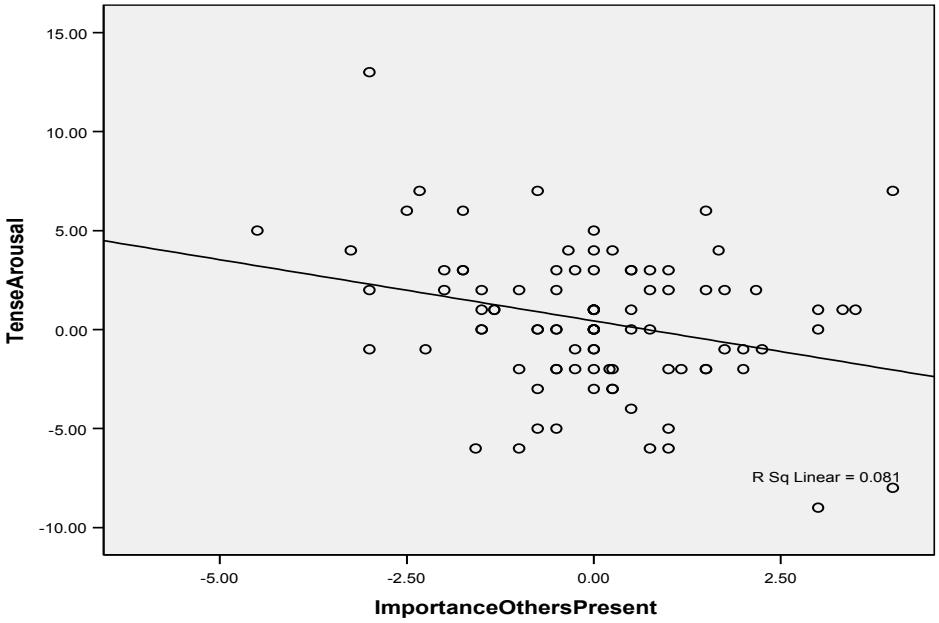
Hypothesis 3.2 (vii): there was a significant negative correlation between tense arousal and valence ($r = -0.43$, $p < 0.05$ see Graph 8). This means that, as a person's negative mood increased, the events were more negatively toned.

Graph 8: Scatter plot for change scores between tense arousal and valence for present memories



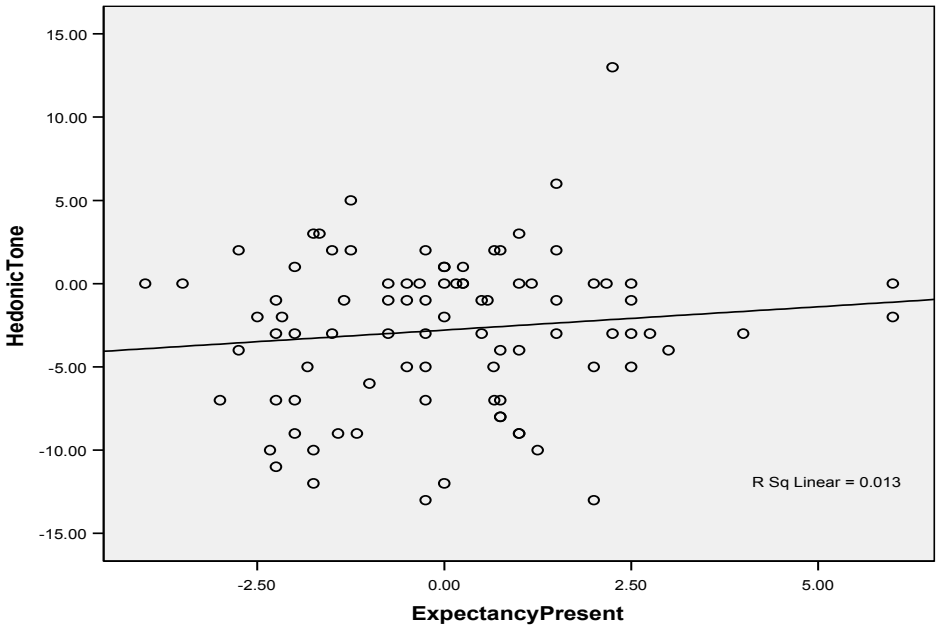
Hypothesis 3.2 (iii): there was a second significant negative correlation between tense arousal and the importance of other people ($r = -0.47$, $p < 0.05$ see Graph 9 on the next page). This means that, as a person's negative mood increased, the importance of other people in the event decreased.

Graph 9: Scatter plot for change scores between tense arousal and importance of other people for present memories



Hypothesis 3.2 (iv): there was a significant positive correlation found between hedonic tone and expectancy ($r = 0.51$, $p < 0.05$ see Graph 10). This means that as a person's negative mood increased, the expectancy of the event decreased.

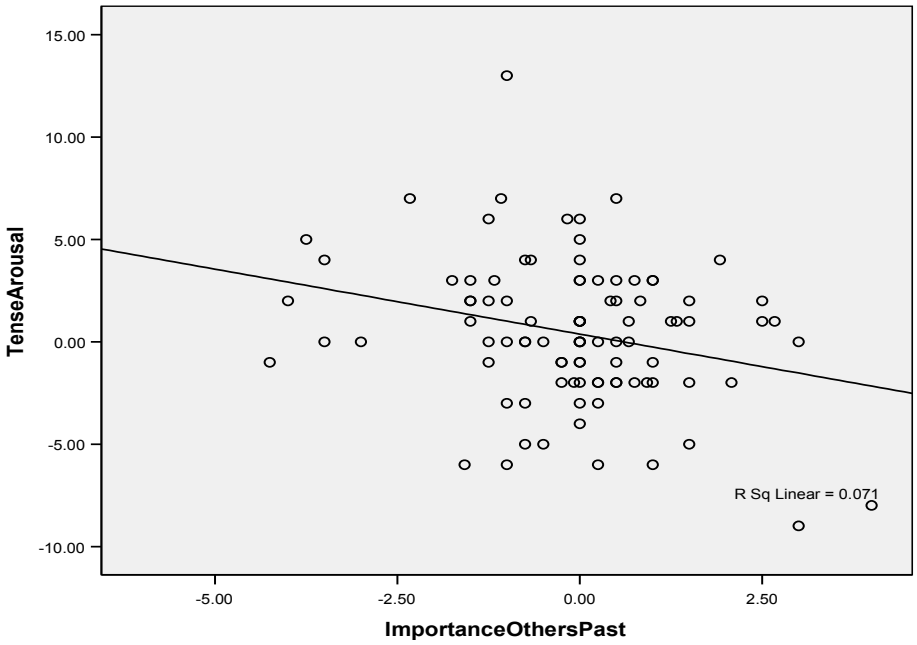
Graph 10: Scatter plot for change scores between hedonic tone and expectancy for present memories



The correlations for ‘past’ memories in the vulnerable start in the fourth column and then alternate columns.

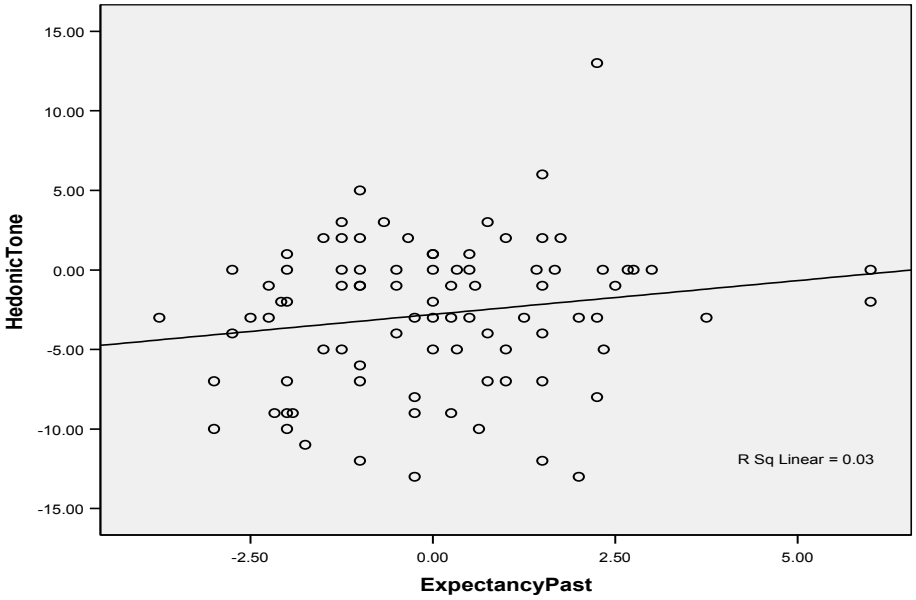
Hypothesis 3.2 (iii): there was a significant negative correlation between tense arousal and the importance of other people ($r = -0.51$, $p < 0.05$ see Graph 11). This means that, as a person’s negative mood increased, the importance of other people decreased.

Graph 11: Scatter plot for change scores between tense arousal and importance of other people for past memories



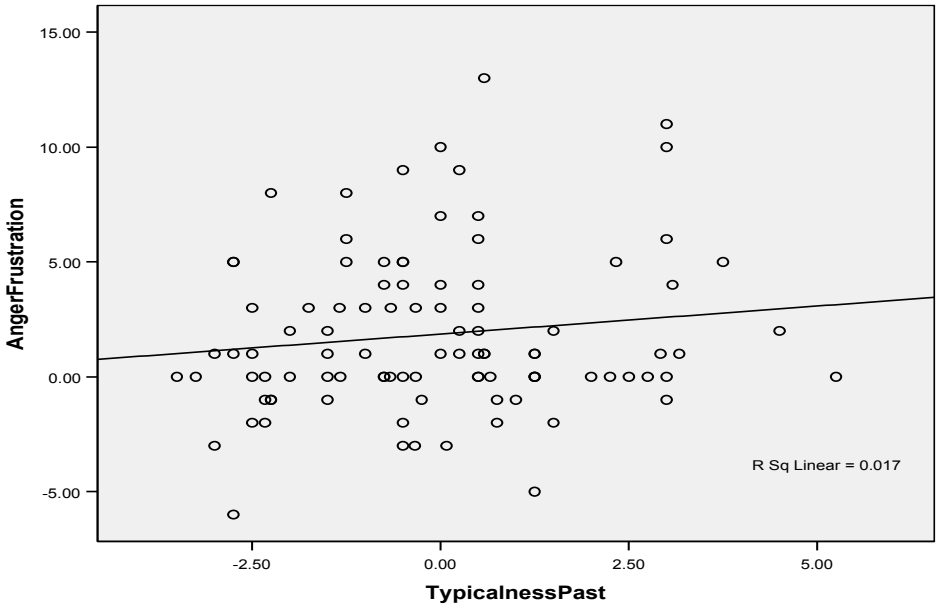
Hypothesis 3.2 (iv): there was a significant positive correlation between hedonic tone and expectancy of the event ($r = 0.55$, $p < 0.01$ see Graph 12 on the next page). This means that, as a person’s negative mood increased, the expectancy of the autobiographical event decreased.

Graph 12: Scatter plot for change scores between hedonic tone and expectancy for past memories



Hypothesis 3.2 (i): there was significant positive correlation between anger/ frustration and typicalness ($r = 0.43$, $p < 0.05$ see Graph 13). This means that as a person's negative mood increased, the typicalness of the autobiographical event increased. This means that anger/frustration memories are remembered in greater detail.

Graph 13: Scatter plot for change scores between anger/frustration and typicalness for past memories

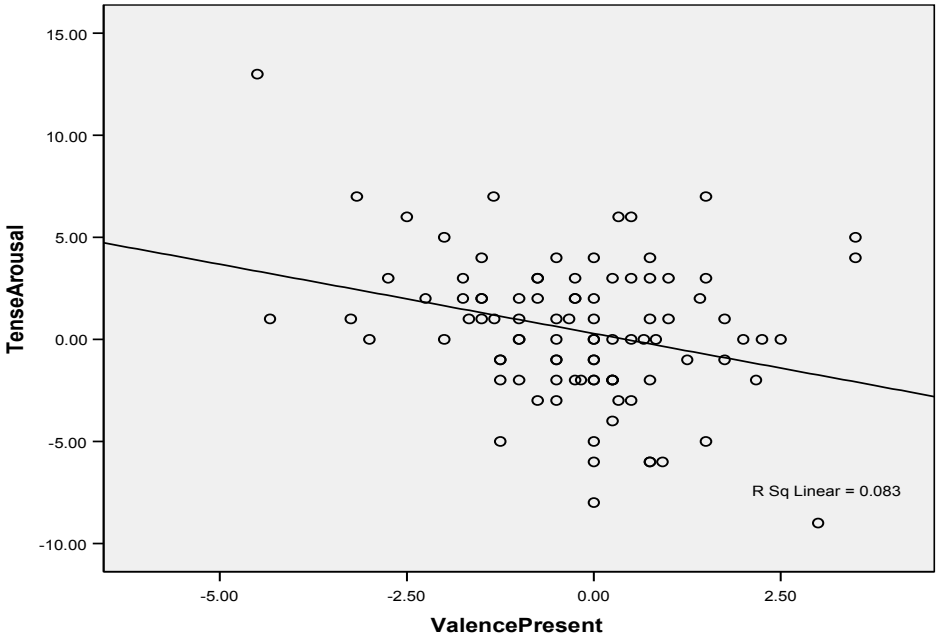


Non-vulnerable

The correlations for 'present' memories in the non-vulnerable are also presented in Table 21.

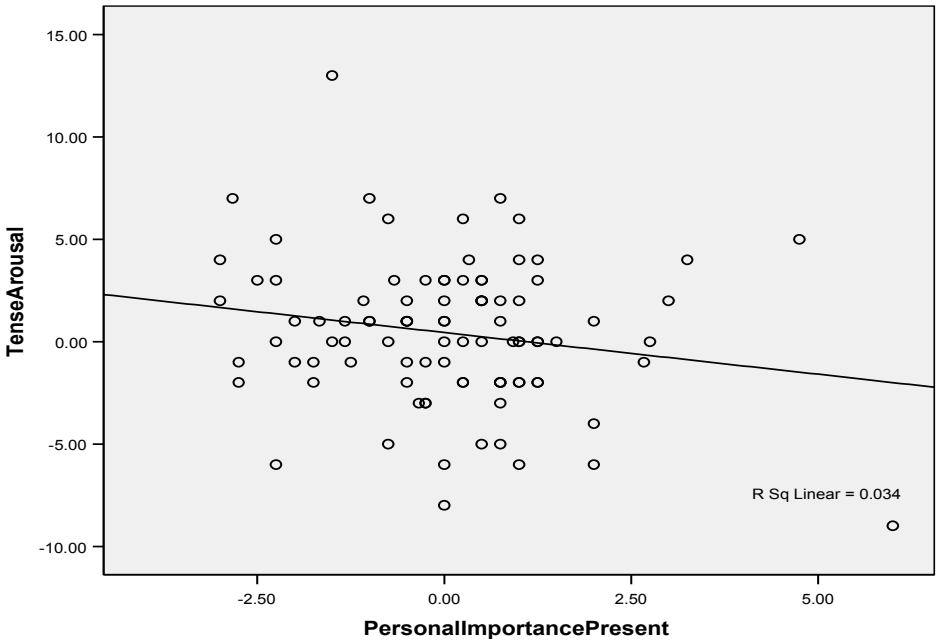
Hypothesis 3.2 (vii): there was a significant negative correlation between tense arousal and valence ($r = -0.26$, $p < 0.05$ see Graph 14). This means that as a person's negative mood increased, there was an increase in negatively toned events being recalled.

Graph 14: Scatter plot for change scores between tense arousal and valence for present memories



Hypothesis 3.2 (iii): there was a significant negative correlation between tense arousal and the importance of other people ($r = -0.24$, $p < 0.05$ see Graph 15 on the next page). This means that as a person's negative mood increased, the importance of other people decreased.

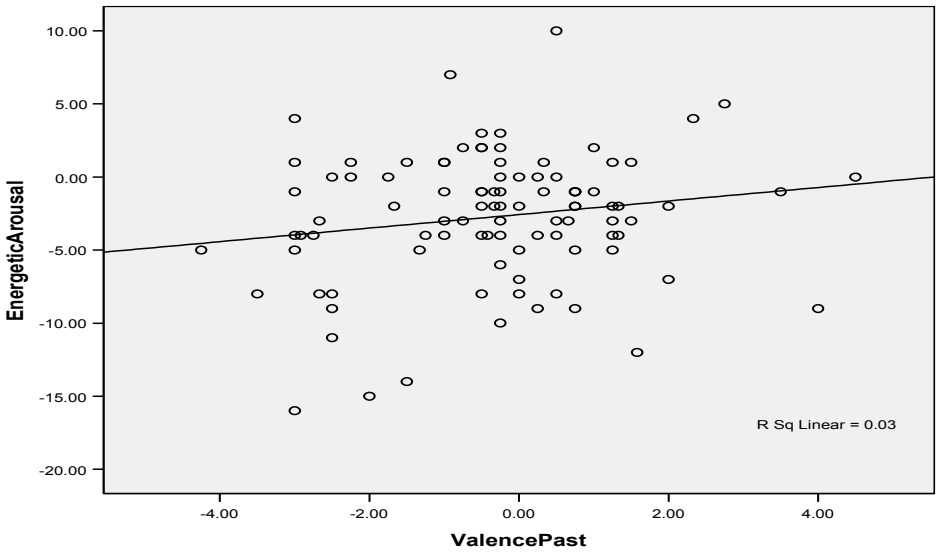
Graph 15: Scatter plot for change scores between tense arousal and importance of other people for present memories



The correlations for 'past' memories in the non-vulnerable start in the fourth column and then alternate columns.

Hypothesis 3.2 (vii): a significant positive correlation was found between energetic arousal and valence ($r = 0.24$, $p < 0.05$ see Graph 16 on the next page). This indicates that as a person's energetic arousal increased, there was an associated decrease in positive feelings.

Graph 16: Scatter plot for change scores between energetic arousal and valence for past memories



CAMQ change score correlations: Vulnerable

The change correlations between sub-scales on CAMQ for 'present' memories in the vulnerable indicated that key features such as valence demonstrated positive correlations with other people ($r = 0.59$, $p < 0.01$), desirability ($r = 0.58$, $p < 0.01$) and personal importance ($r = 0.50$, $p < 0.01$). The results indicated that as valence became more negative, cognitive aspects such as desirability and personal importance of the event decreased. Personal importance demonstrated positive correlations with rumination ($r = 0.45$, $p < 0.05$), valence ($r = 0.50$, $p < 0.01$) and other people ($r = 0.56$, $p < 0.01$). The results indicated that as personal importance of the event increased, cognitive aspects such as rumination and valence increased.

The change correlations between sub-scales on CAMQ for 'past' memories in the vulnerable indicated that key features such as valence demonstrated consistent positive correlations with other people ($r = 0.75$, $p < 0.001$), desirability ($r = 0.86$, $p < 0.001$) and personal importance ($r = 0.55$, $p < 0.01$). The results indicated that as valence became more negative, cognitive aspects such as the involvement of other people, desirability and personal importance of the event decreased. Personal importance demonstrated consistent positive correlations

with rumination ($r = 0.42$, $p < 0.01$), valence ($r = 0.55$, $p < 0.01$) and other people ($r = 0.42$, $p < 0.05$). The results indicated that as personal importance of the event increased, cognitive aspects such as rumination, valence and other people increased.

Non-vulnerable

The change correlations between sub-scales on CAMQ for 'present' memories in the non-vulnerable indicated that key features such as valence demonstrated positive correlations with expectancy ($r = 0.24$, $p < 0.05$), desirability ($r = 0.45$, $p < 0.001$) and personal importance ($r = 0.25$, $p < 0.05$). The results indicated that as valence became more negative, cognitive aspects such as expectancy, desirability and personal importance of the event decreased. Personal importance demonstrated positive correlations with typicalness ($r = 0.33$, $p < 0.01$), rumination ($r = 0.53$, $p < 0.001$) and valence ($r = 0.25$, $p < 0.05$). The results indicated that as personal importance of the event increased, cognitive aspects such as typicalness, rumination and valence increased.

The change correlations between sub-scales on CAMQ for 'past' memories in the non-vulnerable indicated that key features such as valence demonstrated positive correlations with desirability ($r = 0.64$, $p < 0.001$) and personal importance ($r = 0.42$, $p < 0.001$). The results indicated that as valence became more negative, cognitive aspects such as desirability and personal importance of the event decreased. Personal importance demonstrated positive correlations with rumination ($r = 0.25$, $p < 0.05$) and valence ($r = 0.42$, $p < 0.001$). The results indicated that as personal importance of the event increased, cognitive aspects such as rumination and valence increased.

To summarise, the change score intercorrelations showed an overall responsiveness of cognitive reactivity in the vulnerable group compared with the overall diffuse response observed in the non-vulnerable group.

4.3.3.4 Intercorrelation of change scores in the four sub-scales on the UWIST-MACL and the Automatic Thoughts Questionnaire (ATQ) and its four sub-scales

The Automatic Thoughts Questionnaire (ATQ) was used to assess frequency of automatic thoughts (Hollon & Kendall, 1980). It is an instrument designed to identify and measure the frequency of automatic thoughts associated with depression. Table 22 (on the next page) presents the Pearson correlation between the UWIST-MACL and the Automatic Thoughts Questionnaire and sub-scales. Statistical significance was set at $p < 0.05$ and all tests were two-tailed.

As expected, the correlations between the change scores on the UWIST-MACL suggested appropriate directional relationships considering that scales on hedonic tone and energetic arousal are negatively related to the level of negative mood (low-scaled scores represent greater negative mood), whereas higher values reflect a greater negative mood on tense arousal and anger/frustration scales.

UWIST-MACL and ATQ change score intercorrelations

The correlations between the change scores between the UWIST-MACL and the ATQ are presented in Table 22 (on the next page).

Hypothesis 3.3: there was a significant negative correlation between hedonic tone and ATQ. Hedonic tone demonstrated a significant increase in negative mood, which showed significant negative correlations with the Automatic Thoughts Questionnaire ($r = -0.29$, $p < 0.01$), personal maladjustment and desire for change ($r = -0.31$, $p < 0.01$), negative self-concept and negative expectations ($r = 0.26$, $p < 0.05$) and low self-esteem ($r = 0.23$, $p < 0.05$). This means that, as a person's negative mood increased, the amount of automatic thoughts, personal maladjustment and desire for change, negative self-concept and negative expectations and self-esteem decreased.

Table 22: Intercorrelation of change scores in the four sub-scales on the UWIST-MACL and the Automatic Thoughts Questionnaire (ATQ) and its four sub-scales

	EA Energetic Arousal	TA Tense Arousal	HT Hedonic Tone	AF Anger/ Frustration	ATQ Automatic Thoughts Questionnaire	PMD Personal maladjustment and desire for change	SCE Negative self-concept and negative expectations	LSE Low self-esteem	GUH Giving up/ helpless-ness
EA									
TA	-0.22*								
HT	0.67***	-0.41***							
AF	-0.21*	0.26*	-0.35***						
ATQ	-0.04	0.13	-0.29**	0.03					
PMD	0.04	0.16	-0.31**	-0.04	0.82***				
SCE	-0.15	0.14	-0.26*	0.07	0.81***	0.49***			
LSE	-0.08	0.09	-0.23*	-0.04	0.68***	0.50***	0.48***		
GUH	0.07	0.05	-0.20	0.01	0.62***	0.43***	0.53***	0.44***	---

Note: ATQ = Automatic Thoughts Questionnaire, PMD = Personal maladjustment and desire for change, SCE = Negative self-concept and negative expectations, LSE = Low self-esteem, GUH = Giving up/helplessness

*** Correlation is significant at the 0.001 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

ATQ change score inter-correlations

The change correlations between sub-scales on the Automatic Thoughts Questionnaire indicated significant positive correlations in the expected direction between all sub-scales: personal maladjustment and desire for change, negative self-concept and negative expectations, low self-esteem and giving up/ helplessness.

To summarise, an overall increase in negative automatic thoughts as measured by the ATQ was observed with overall increase in negative mood as measured by the UWIST-MACL mood measures.

4.3.3.5 Post hoc examination of the difference between vulnerable and non-vulnerable correlations between anger/frustration and rumination

The researcher was interested in whether the relationships between the rumination correlations in the vulnerable and non-vulnerable groups were statistically different. The Pearson's correlation for rumination on the four the UWIST-MACL sub-scales between vulnerable and non-vulnerable were analysed, with anger/frustration showing a significant difference. Anger/frustration correlations were -0.16 for the vulnerable group and 0.31 for the non-vulnerable group. The procedure for computing a confidence interval on the difference between two independent correlations involved the construction of Z values. The value of Z can be applied to assess the significance of the difference between two correlation coefficients. The Z values with corresponding correlations and a p-value are produced in Table 23.

Table 23: Difference between vulnerable and non-vulnerable Pearson's r correlations in rumination

R1 Pearson's r (non-vulnerable)	**N1** (non-vulner-able)	**R2** Pearson's r (vulnerable)	**N2** (vulnerable)	**Zf1** (non-vulner-able)	**Zf2** (vulner-able)	**Z**	**p**
0.31	26	-0.16	73	0.32	-0.16	1.99	0.047

$Z = 1.99$ $p < 0.05$

Hypothesis 3.2 (ii): there was a significant difference in rumination between vulnerable and non-vulnerable groups ($Z = 1.99$ $p < 0.05$) for anger/frustration, with the vulnerable group showing an increase in rumination and the non-vulnerable group showing a decrease in rumination.

4.3.3.6 Post hoc examination of the difference between rumination for 'past' appraisals for vulnerable and non-vulnerable groups

The computation of the value of the Mann-Whitney U test involved comparing the pre and post scores, ranking the absolute values of the difference scores, and then finding the Mean Rank for all the cases. It is a non-parametric test for assessing whether two samples of observations come from the same distribution. The null hypothesis is that the two samples are drawn from a single population, and therefore that their probability distributions are equal. The Mann-Whitney U test is virtually identical to performing an ordinary parametric two-sample t-test on the data after ranking the combined samples. Table 24 presents the mean rank 'past' appraisals for rumination in the vulnerable and non-vulnerable.

Table 24: Post hoc examination of the difference between Mean Rank rumination for pre and post 'past' appraisals for vulnerable and non-vulnerable groups

Δ	Mean rank Pre mood induction	Mean rank Post mood induction
Vulnerable	41.00	52.25
Non-vulnerable	56.53	50.57

$Z = -2.306$, $p = 0.021$

Hypothesis 3.2 (ii): there was a significant difference between pre and post manipulation mean rank rumination scores for 'past' appraisals for vulnerable and non-vulnerable groups ($Z = -2.306$, $p < 0.05$). The results suggested that vulnerable individuals ruminate more post manipulation than non-vulnerable individuals, who ruminate less post manipulation for 'past' appraisals.

4.3.3.7 Post hoc examination of the difference between rumination for 'past' and 'present' appraisals for vulnerable and non-vulnerable groups

The Mann-Whitney U test was used to test the difference between vulnerable and non-vulnerable groups. The test involved computing the difference scores, ranking the absolute values of the difference scores, and then finding the Mean Rank for all the cases. This two-sample test may be thought of as testing the null hypothesis that the probability of an observation from one population exceeding an observation from the second population is 0.5. Table 25 presents the mean rank difference between 'past' and 'present' appraisals for rumination in the vulnerable and non-vulnerable.

Table 25: Post hoc examination of Mean Rank rumination for 'past' and 'present' appraisals for vulnerable and non-vulnerable groups

Δ	Mean rank Rumination 'past'	Mean rank Rumination 'present'
Vulnerable	60.54	46.42
Non-vulnerable	47.69	51.93

Z = -1.928, p = 0.054, n.s.

Hypothesis 3.1 (ii): there was a non significant difference in post manipulation mean rank rumination scores for 'past' and 'present' appraisals between vulnerable and non-vulnerable groups (Z = -1.928, p = 0.054, n.s.). The results suggested that vulnerable individuals do not ruminate more about 'past' than 'present' memories and non-vulnerable individuals do not ruminate more about 'present' than 'past' memories due to the non significant result.

To summarise the post hoc calculations, there was a significant difference between vulnerable and non-vulnerable correlations between anger/frustration and rumination. There was also an overall significant difference observed between vulnerable individuals that ruminate more than non-vulnerable individuals but only for 'past' appraisals post mood manipulation. The differences

in the rumination between vulnerable and non-vulnerable participants may indicate a coping strategy in non-vulnerable individuals.

4.4 Discussion

The results and their interpretation are tentative in the light of the exploratory nature and the lack of correction for multiple testing. The study described here was designed to explore the effects of mood manipulation on the cognitive content of cued autobiographical memories in vulnerable and non-vulnerable groups. Miranda et al. (1998) experimentally induced low mood in participants and found that vulnerable individuals reported increased cognitive structures, whereas non-vulnerable individuals reported decreased cognitive structures. This so called 'mood-state hypothesis' as suggested by Miranda et al. (1988) suggests that low mood acts as a primer to negative cognitive structures. This fits in well with Beck's theory (Beck, 1967 & 1987) by suggesting that low mood acts to prime latent negative cognitive structures into action. Bower's associative network theory (Bower, 1981 & 1987) accounts for the second observation that mood instigates negative cognitive structures but only in the previously depressed and not in the never depressed. Negative cognitive structures, once activated, will negatively influence the individual's coping style and automatic and self-compensatory strategies (Beevers, Rohde, Stice & Holen-Hoeksema, 2007).

4.4.1 Intercorrelation of change scores indicated that autobiographical retrieval showed reactivity in those with a previous history

The key finding in the present study suggests that vulnerable and non-vulnerable individuals have different specificity of cognitive content following a mood induction procedure. This supports Hypothesis 3.2 that there would be a difference between the vulnerable and non-vulnerable. The results suggested that the vulnerable group showed cognitive bias under mood stress, with other people being seen as less important and future events being evaluated as less certain. This supports Hypothesis 3.1 (iii and iv) that there would be a change in these characteristics. This is congruent with previous empirical research by Beevers et al. (2007) showing that those with a previous history of depression

displayed a deviation in certain cognitive characteristics when compared to never depressed controls. The study by Beevers et al. (2007) used naturally occurring mood instead of a mood induction.

The present findings also indicated that the valence for memories of present events compared to past events in the vulnerable was endorsed more negatively, in line with previous findings (Serrano, Latorre & Gatz, 2007; Yang & Rehm, 1993). This supports Hypothesis 3.1 vii that there would be a difference in present and past appraisals. In contrast, the valence endorsements for memories of present and past events had equal negativity and other people were viewed as being more important for the non-vulnerable group. This supports Hypothesis 3.2 vii that there would be a difference between the vulnerable and the non-vulnerable. Overall, the vulnerable group showed a non-diffuse negative bias in cognitive reactivity under mood stress.

4.4.2 Intercorrelation of change scores indicated that automatic negative thoughts were reactive to temporary negative mood state

The results from this study provide further collaborative support that negative mood is possibly a good predictor of negative automatic thoughts as measured by the Automatic Thoughts Questionnaire (ATQ). The greater the negative mood as measured by the UWIST-MACL, the greater the frequency of negative automatic thoughts reported by participants. Hedonic tone was the best predictor of negative automatic thoughts, with it correlating with personal maladjustment and desire for change, negative self concept and negative expectations, low self esteem and giving up/helplessness. This supports Hypothesis 3.3 that there would be a change in automatic thoughts. Automatic thoughts are seen as relatively accessible content for research purposes and reflect salient schema at that point in time (Calvete & Connor-Smith, 2005). The present research supports the accessibility of automatic thoughts which seem to reflect the mood state of the individual. Interestingly, the cued autobiographical content seems to represent a second higher level of content, which showed diffuse findings compared to the ATQ non-diffuse results.

The results provide collaborative evidence that supports studies 1 & 2, which suggest that the mood induction procedure produces significant mood change, with participants showing more anxiety and nervousness, diminished pleasure and increased feelings of anger and frustration. The three significant changes were hedonic tone, energetic arousal and anger/frustration. Low levels of hedonic tone reported are associated with unpleasant and sad mood sates. Low levels of energetic arousal as reported in the present study are associated with states such as lethargy, tiredness and weariness. High levels of anger/frustration are associated with mood states that are negative in tone but activating states such as fear and anger. Tense arousal was in the right direction but non-significant. High levels of tense arousal are related to states such as nervousness and agitation. These results support the proposals that the mood induction technique results in negative mood change in individuals.

4.4.3 Anger/frustration correlated with increased rumination in vulnerable

In the current study, a post hoc examination was conducted to further interrogate the cognitive bias in the vulnerable and non-vulnerable (Hypothesis 3.2 ii). The post hoc examination was designed to examine the impact of mood on rumination. The effect of mood on rumination and its resultant impact on autobiographical memory and cognitive content is seen as pivotal in understanding the relationship between mood and autobiographical memory content. Pearson's correlation for rumination on the four the UWIST-MACL sub-scales between vulnerable and non-vulnerable was analysed, with anger/frustration showing a significant difference. Anger/frustration rumination is similar to sadness rumination but with thinking being repeatedly about past experiences of anger (Sukhodolsky, Golub & Cromwell, 2001). The present findings support the observations by Segal et al. (2002) which emphasized that small changes in mood are sufficient to activate cognitive styles in cognitively vulnerable individuals who tend to ruminate more easily about recalled events. This supports Hypothesis 3.2 ii that there would be a difference between the vulnerable and non-vulnerable. Interestingly, the non-vulnerable individuals

showed reduced ruminative processing when exposed to negative mood. This finding supports Nolen-Hoeksema's (1991) research that non-vulnerable individuals differ from vulnerable individuals in the ability to circumvent rumination.

4.4.4 Post hoc mean rank scores for rumination are higher in memories for past appraisals in the vulnerable group

The effect of mood on rumination was more globally observed by examining the mean rank rumination for all scores on the UWIST-MACL for present and past memories. The present research suggests that vulnerable participants ruminate more post mood induction about 'past' appraisals (see Table 24). This supports Hypothesis 3.1 ii that there would be a difference in ruminative response in cued recall. This is congruent with previous empirical findings that suggest that rumination correlates with self-statements about inability to control past recall, such as: 'It is impossible to stop thinking about past problems' (Papageorgiou & Wells, 2001 & 2003). The present study also showed that non-vulnerable participants ruminate less about 'past' appraisals in negative mood state. This is congruent with research by Nolen-Hoeksema et al. (2008) suggesting that some participants were more concerned with present and future originated worries compared with other participants whom seem to be concerned with past worries. It is noted that neither the Papageorgiou & Wells (2003) nor the Nolen-Hoeksema et al. (2008) studies explicitly check for previous history or vulnerability, but it does show that differences in ruminative content exist, and future and past origination seem to be important variables.

It is interesting to note two main theoretical processes that could be operating upon cognitive content and may help provide a theoretical explanation for the findings (Williams et al., 1997). These are priming and elaboration. It is argued that those with a previous history of depression show elaborative processes that concentrate on negative self-referent information more than the never depressed. It is also suggested that depression affects the active strategic elements of memory retrieval, enhancing the recall of negative material from previous past

events (Williams et al., 1997). The findings from the present research tentatively provide some supportive data for increased ruminative content in the vulnerable, and some indirect data about enhancing the recall for past events.

4.4.5 Conclusion

The present study supports previous findings that negative mood may be instigating negative cognitive structures selectively in the vulnerable but not in the non-vulnerable, which is taken to support Bower's associative network theory (Bower, 1981 & 1987). The results also suggest that there are differences between vulnerable and non-vulnerable individuals in the amount they ruminate about the event, with vulnerable individuals showing an increased rumination while non-vulnerable show decreased rumination post mood induction. There was no direct evidence supporting Hypothesis 3.1 (i, v and vi). There is some evidence in the present study for differential self-referent coping strategies between the vulnerable and non-vulnerable, supporting the mood state hypothesis and hinting at a self-regulatory coping strategy that involves the degree to which rumination is engaged or disengaged.

The affective prime did result in changes on endorsements of autobiographical cognitive content. The present study supports Hypothesis 3.1 (iii, iv and vii) that a temporary negative mood state in the vulnerable group showed significant cognitive reactivity resulting in a change in importance of other people (i.e. decrease) and a change in expectancy (i.e. decrease) with increased tense arousal and a change in valence of recalled memories (i.e. decrease) with increased hedonic tone. Autobiographical technique showed that mood induction could cue significant changes in autobiographical appraisals of rumination which showed increased rumination in vulnerable group. The present study supports Hypothesis 3.1 ii that there would be a change in this characteristic. The findings from the present research are in line with previous research which shows there is an increase in rumination in the previously depressed group compared to those without previous depressive episodes under mood stress (Morrow & Nolen-Hoeksema, 1990). The present study found that rumination was higher in

memories for past appraisals in the vulnerable group when in temporary negative mood state.

The findings suggest that a temporary negative mood state in the non-vulnerable group showed a significant decrease in rumination with increased negative mood. It is not known if this is a direct consequence of negative mood or represents a lack of the presence of previous history of depression or any other third variable. This is consistent with top-down hierarchical search from semantic, categorical to specific memories. Negative mood is proposed to result in a truncated search, in which individuals prematurely abandon their search at a higher, less specific stage containing overgeneral memory and ruminative style (Williams et al., 2006b). This seems to explain the finding within the vulnerable group, which showed increased rumination, and the non-vulnerable group, which showed decreased rumination.

However, the present research has not disentangled the vulnerability factors that may be the consequence of having had a previous episode of depression, and factors that contributed to dispositional depressive symptoms. Given the evidence from this study (supporting Hypotheses 3.1 ii, iii, iv and vii, 3.2 and 3.3) and its limitations (no evidence supporting Hypothesis 3.1 i, v and vi), it could prove fruitful to examine cognitive content within the retrieved autobiographical memories in the vulnerable and non-vulnerable and the symptomatic and non-symptomatic in the same study. It can be predicted that cognitive content might be reactive to the same extent if latent cognitive styles are present in both groups. This is therefore addressed in the next study.

CHAPTER 5

STUDY 4: Autobiographical memory responsiveness to an induced negative mood state: Self-focused cognitive appraisals in those self-reporting vulnerability or depressive symptoms.

5.1 Introduction

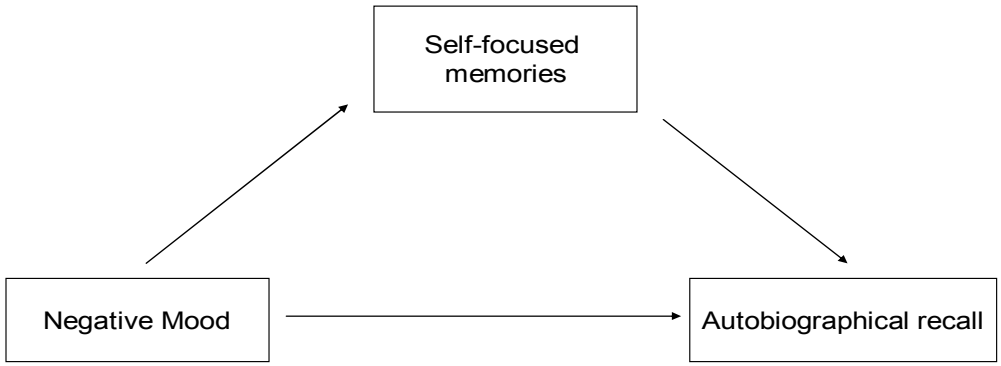
Study 3 found that autobiographical retrieval showed some cognitive reactivity in those with a previous history. The findings suggested that negative mood may be instigating cognitive content selectively in the vulnerable but not in the non-vulnerable. The results also suggested that there are differences between vulnerable and non-vulnerable individuals in the amount they ruminate about an event, with vulnerable individuals showing an increased rumination while non-vulnerable show decreased rumination. The result suggested that the vulnerable group showed cognitive bias, with future events being evaluated as less certain and other people being seen as less important. In contrast, other people were viewed as being more important for the non-vulnerable group. Rumination was another cognitive style which was higher in the vulnerable for past memories. Overall, the vulnerable group showed a non-diffuse negative bias in cognitive reactivity under mood stress.

The present study builds on this initial evidence for low mood affecting autobiographical retrieval by further examining whether the cognitive content following a negative mood induction procedure is sensitive to mood change in vulnerable and symptomatic groups. The focus in the present study was observing and measuring the change in content against the entity of negative mood state rather than individual negative mood components, which were undertaken previously in Studies 1-3. Nolen-Hoeksema (1990) suggests that negative mood affects the way in which the vulnerable or symptomatic respond cognitively. The vulnerable and symptomatic responded by increasing self-focused behavior, which seemed to increases ruminative response style (Nolen-Hoeksema, 1990). Self-focused memories suggest a heightened self-awareness

of internally generated information rather than awareness of externally generated information (Nolen-Hoeksema, 1990). Self-focused attention has been associated with increased cognitive reactivity and diffuse memory (Chentsova-Dutton & Tsai, 2010). In the present study, the researcher sought to add to the literature by looking at self-focused autobiographical memories in vulnerable and symptomatic groups to determine the effects of negative mood on autobiographical content.

There is evidence to suggest that how a person thinks about self can trigger or confer depressive vulnerability (Dozois & Dobson, 2001 & 2003). Self-referent cognitions are known to be relapse markers for depression (Segal et al., 1999), and therefore might represent a possible moderating factor. The literature suggests that moderating factors might be activated by temporary mood state (Miranda et al., 1998; Miranda & Persons, 1998). Self focused memories were operationally defined as a moderator variable as it might be helpful in explaining the strength of the relationship that exists between mood and cued autobiographical memory. To date, however, little research has investigated the effects of mood state on self-focused autobiographical content. Therefore the present study turns its attention to self-focused autobiographical content. Figure 6 (on the next page) shows the potential for self-focused memories acting to moderate autobiographical recall.

Figure 6: Self focused memories as a moderator in symptomatic and vulnerable groups



The cognitive content of autobiographical memory is agreed to contain self-related knowledge that represents specific experiences from episodic memory (Conway, 1990 & 2001). Another defining feature of autobiographical memory is that it contains self-related material which can also be held at a generic and semantic level rather than a specific episodic event. Recent research has concentrated on this feature of autobiographical memory retrieval, that is, the level of specificity over generality of the self-related knowledge. Research interest in autobiographical memory suggests that negative mood can instigate vulnerable individuals to focus on self-related knowledge which is retrieved in a more overgeneral fashion and tends to be more personally focused in the depressed than the non-depressed (Just & Alloy, 1997; Roberts, Gilboa & Gotlib, 1988).

The autobiographical memory model proposed by Conway & Pleydell-Pearce (2000) has suggested that retrieval of specific information on episodic memories is influenced by the goal structure of the 'working self'. It is the goal structure which is stored in the autobiographical knowledge base that drives recall of

certain autobiographical memories. An implication of this model is that depressed individuals selectively retrieve memories related to their dysphoric mood which are concerned about goal attainment being obstructed by poor self image, lack of instrumental support from others and a future that looks bleak (Williams et al., 2006a). Hence, the model suggests that because the dysphoric individual is concerned about these frustrated past goals, they then perceive themselves as obstructed individuals in the present (Conway & Pleydell-Pearce, 2000). They therefore tend to selectively recall memories of negative past events that reinforce the perception that they are indeed obstructed in the present. This is then represented as a self-defining view of oneself in the 'working self' (Conway & Pleydell-Pearce, 2000). These semantic associations are a far more important aspect of autobiographical content than categoric memories (Williams, 2000). According to Conway & Pleydell-Pearce's (2000) hierarchical model, semantic associations are situated at a higher level in the self-memory system than categoric memories and represent overgeneral semantic personal information in the self-memory system (Raes et al., 2007).

In pursuit of the content of autobiographical information that represents low mood during transient negative mood, it is recognised that cued autobiographical memory has hitherto concentrated more on the valence of memories without extracting personally important events that represent the 'working self' (Mor & Winquist, 2002). The following two studies will readdress this methodological problem by requesting participants to provide six 'I am' statements (Moulin, Rathbone & Conway, 2006, cited in Conway 2005) that will focus attention on self-defining memories while avoiding the specific request to focus on a specific memory that may direct the individuals to search the hierarchy for categoric rather than personally important semantic memories in the self-memory system (Pyszczynski & Greenberg, 1987).

The present study focuses on self-focused memories to measure implicit processes in a cued recall procedure by asking participants to rate the memory event on a number of endorsements (e.g. typicalness, rumination etc) that are of

interest to researchers who are concerned with investigating and accounting for mental content in negative mood states. Implicit memory is 'without conscious awareness' and automatic, thus has limited impact on working memory processing resources (Watkins et al., 2000b)

5.1.1 Purpose of the study

This study sought to understand the effect of negative mood on cognitive content within self-focused autobiographical memories in those self-reporting vulnerability or depressive symptoms. The idea of the present study is to evoke self-focused memories by asking participants to rate the memory on a number of characteristics. The characteristics were: typicalness, rumination, importance of other people, expectancy and valence of the recalled event. These characteristics represent key components of autobiographical memory in the literature, which have been introduced in Chapter 3. These cognitive attributes have been suggested to guide appraisal and interact with mood state to influence memory search and attention. There appears to be limited and indirect research available to demonstrate how these variables are influenced by current negative mood in those self-reporting vulnerability or depressive symptoms in one study. The influence of mood on autobiographical memory appears to be generally consistent with the predictions for the characteristics made in Chapter 3.

To address the general aim of how mood affects autobiographical retrieval, participants rated a number of characteristics, endorsing them on an analogue scale. The endorsements were then observed pre and post mood induction and observed against four dimensions of negative mood as measured by the UWIST-MACL (Matthews et al., 1990). The general aim was propagated in response to the lack of research investigating how mood affects the recalled content in autobiographical memories. Furthermore, by examining the influence of vulnerability and its effects on accessibility of the cognitive products, it was hoped that the importance of previous history and depressive symptomatology in the presence of temporary mood state could be elucidated.

The present study employed a non-clinical sample to examine the mean difference in change scores at t1 and t2 in recalled autobiographical content whilst examining the influence of vulnerability and depressive symptomatology. A sample of students underwent autobiographical memory tests focusing on the memory appraisal before and after a negative mood induction procedure. The content held within autobiographical memory may be affected by such negative mood shifts. There appears to be a lack of research investigating how negative mood affects autobiographical memory content.

In summary, the influence of negative mood on autobiographical memory appears to be generally consistent with the expectations for the seven characteristics in section 3.2.3; negative mood may result in change in typicalness, desirability and increased rumination, importance of other people, expectancy and negatively valenced events. These characteristics may be more pronounced in individuals with vulnerability and depressive symptomatology. The present research investigated the differences between dimensions of mood as measured by the UWIST-MACL, and effects on both cognitive content and memory changes on the free recall of autobiographical memories. The autobiographical memories were investigated in those with and without a previous history of depression and those with and without depressive symptomatology. The highlighted characteristics of autobiographical memory have emerged from research and opened up further questions on the effects of negative mood on autobiographical content.

The present study was designed to address two areas of uncertainty concerning mood effects on autobiographical retrieval:

(a) Is autobiographical retrieval more reactive to self-focused memories?

(b) Is there a change in endorsements on autobiographical memories between those participants self-reporting vulnerability or non-vulnerability and in those self-reporting depressive symptoms or no depressive symptoms?

From these general aims, a number of specific hypotheses were developed to investigate the effects of mood on autobiographical retrieval. It was hypothesised that negative mood would predict a change from pre to post mood induction in the endorsements on the Cued Autobiographical Memory Questionnaire – specifically that negative mood would predict a change in endorsements of:

i) typicalness in cued autobiographical recall (Coluccia et al., 2006)
ii) ruminative response in cued recall (Williams et al., 2006a
iii) negative evaluation of the importance of other people (Ryan & Deci, 2000)
iv) the ability to conceptualize and judge the likelihood of future events in cued recall (Williams et al., 2006a)
v) personal importance of cued memory recall (Williams et al., 2008)

vi) desirability in cued memory recall (Ryan & Deci, 2000)
vii) valence in cued memory recall (Walker et al., 2003).

$H_{4.1}$ It was hypothesised that there would be a change from pre to post mood induction in the endorsements on the cued autobiographical memory characteristics i-vii above

$H_{4.2}$ It was also hypothesised that there would be a difference between the vulnerable and non-vulnerable endorsements for characteristics i-vii above.

$H_{4.3}$ It was also hypothesised that there would be a difference between the symptomatic and non-symptomatic endorsements for characteristics i-vii above.

5.2 Method

5.2.1 Participants

The participants were made up of 33 student volunteers from the University of Chester, providing reasonable power for statistical and correlational analysis.

Students in the present study had not participated in the previous studies. The sample was comprised of participants who were recruited from cohorts of students in the Faculty of Health and Social Care. Participants were recruited in groups of approximately sixteen, and underwent the group procedure (detailed in the procedures section). 11 participants were excluded for their own protection on the basis of their high BDI-2 score (see section 2.2.3 for ethical procedure and support offered to all participants). A power calculation was conducted on GPOWER, a general power analysis program (Erdfelder et al., 1996). Sample size of 33, with alpha level set at p = 0.05, a large effect size (r = 0.5), gives 94% power to detect real difference due to treatment effect, rather than chance.

Ethical approval was granted by the Psychology Departmental Ethics Committee prior to data collection, and ethical approval for access to students was granted from the Faculty of Health and Social Care Ethics Committee prior to recruitment of participants.

5.2.2 Materials and measures

Along with the mood induction procedure, the following five psychometric materials and measures were utilised in this study:

Depressive Symptomatology

The Beck Depression Inventory – Version 2 (Beck et al., 1996) was utilised as in Study 2. The BDI-II has demonstrated good internal reliability, reliability and validity (alpha = .82, test-retest reliability between .65 and .72; Vazquez & Sanz, 1991).

Vulnerability to Depression

The vulnerability to depression questionnaire as previously used by Persons & Miranda (1992) was utilised as in Study 3. Participants were asked to self-report whether they had previously been prescribed treatment for depression symptoms, and the asked to select one or more treatments, including pharmacology, cognitive behavioural therapy and counselling. Those who had

received previous treatment were considered vulnerable and those had not and were without a current history were classified as non-vulnerable.

Mood State

The University of Wales Institute of Science and Technology Mood Adjective Checklist (the UWIST-MACL; Matthews et al., 1990) was utilised as in Study 1. The psychometric properties were identified for the UWIST-MACL and shown to have good internal reliability and validity for non-clinical mood variations (Matthews et al., 1990).

Manipulation of attention 'on the self'

The inclusion of six 'I am' prompts was an addition to previous studies and was used to elicit the roles/traits utilised by Moulin et al. (2006, cited in Conway 2005). This manipulation was used to focus the participants' attention on self-cued autobiographical memories. The 'I am' statements were a variant of the Twenty Sentence Test (TST; Kuhn & McPartland, 1954; more recent Gardner, Gabriel & Lee, 1999). Participants were instructed to list nine statements that defined themselves, each statement beginning with the words 'I am' followed by a space to complete the sentence. The modified version of the TST has been used to assess autobiographical content and has been found to have good reliability (Kuhnen & Hannover & Schubert, 2001).

Cued Autobiographical Memory Questionnaire (CAMQ)

The modified version of the Autobiographical Memory Test (AMT; Williams & Broadbent, 1986) has been widely used to assess autobiographical content and has been found to have good reliability (Williams et al., 2007). The explicit instruction to focus on specific memories was removed, which contrasts with previous studies within this research project. The cueing technique was the same as used in Studies 1 to 3, with eleven cue words instead of four cue words (Appendix 8c). The four original words from list A were 'bike', 'tree', 'shed' and 'supermarket'. The additional words from list A were 'car', 'flower', 'garage', 'shop', 'house', 'road' and 'garden'. The additional seven cue words were

introduced to match the comparative procedure in Study 5, which used eleven sentence completion statements to assess overgeneral vs. specific content. These cued events were scored and rated as done in preceding studies. Eleven neutral cue words were provided as cues and participants rated each memory against the listed cognitive events.

Mood manipulation

The intervention phase utilised the Velten Mood Induction Procedure (Velten, 1968) as in Study 2. The Velten Procedure has been found to mimic the affective disturbance and behavioural attributes of depressive states (Bates et al., 1999).

5.2.3 Procedure

Study 4 followed the same procedure as Study 3, with the two procedural changes. The first change involved the inclusion of the manipulation on to self-focused memories high in personal self-related knowledge. This procedure was implemented to increase self-focused autobiographical content.

The second change was to the administration of the cued autobiographical memory task. The questionnaire had eleven cue words instead of the previous four cue words. This was so it would match as closely as possible the sentence completion task in Study 5, which had eleven cue word stems. The questionnaire was administered without the explicit instruction to focus on specific memories, in contrast to previous studies within this research project.

5.2.4 Design & analysis strategy

The experiment had a within subjects design. The predictor or independent variable was mood induction procedure with its effect on the individual's mood, which was measured by the mood adjective checklist and its four sub-scales (Matthews et al., 1990). The outcome variable was the autobiographical content, which was measured by the Cued Autobiographical Memory Questionnaire and

its five response variables. The predictor and outcome variables were defined and are listed in Table 26.

The first stage of the analysis involved the completion of the pre and post scores on the UWIST-MACL and CAMQ. The recorded participant number allowed matching for pre and post scores for each participant and the mean score calculated over eleven cue words. An appropriate test of difference on mean scores on the UWIST-MACL and CAMQ was performed on the data to determine statistical significance. The test of difference, such as a t-test, is usually performed if the data does not differ significantly from a normal distribution. Normality in this instance was determined using the Kolmogorov-Smirnov test.

Table 26: List of predictor and outcome variables

Independent/predictor/ explanatory variable(s)	**Dependent/outcome variable (s)**
The University of Wales Institute of Science and Technology Mood Adjective Checklist (UWIST-MACL)	*Cued Autobiographical Memories Questionnaire (CAMQ)*
Energetic Arousal (EA) Tense Arousal (TA) Hedonic Tone (HT) Anger/frustration (AF)	Typicalness, Rumination, Importance of other people, Expectancy, Importance of the event for self, Desirability and Valence

The second stage involved dividing up the Beck Depression Inventory (BDI-II) scores into non-symptomatic and symptomatic, as done previously in Study 2 section 3.2.4. Twenty-three students were categorised as non-symptomatic and eight students as symptomatic. Furthermore, the non-vulnerable and vulnerable were categorised according to Persons & Miranda (1992), as done in Study 3

section 4.2.4. Twenty-three students were categorised as non-vulnerable and eight students as vulnerable.

The vulnerable and symptomatic groups were utilised respectively as comparison points for non-vulnerable and non-symptomatic, even though the resulting contrasts were not orthogonal. In accordance with the methodology used by Rude, Gortner & Pennebaker (2004), differences were explored using t-test contrasts rather than orthogonal sets of contrasts. The justification to use t test instead of analysis of variance were several. It was reasoned that using orthogonal contrasts or analysis of variance might obscure the picture, as some contrasts – such as previous history and current depressive symptoms – are relatively unknown entities in mood research and likely to be correlated and therefore non orthogonal. Furthermore, the chi squared test supports the prior assumption that depressive symptoms and vulnerability are somewhat associated (see section 5.3.2.1.1 Table 29b). The t-test was also used because of the insights gained from Studies 1-3, in which the change in individual cognitive content characteristic and mood components has already been reported using intercorrelations of change scores. The focus in the present study was observing and measuring the change scores against the entity of negative mood state rather than individual negative mood components, which were dealt with in Studies 1-3.

It was believed that the hypothesis that a change in cognitive content is not dependent on mood state would gain in strength if it could be shown that there was no overall mean change post manipulation. If the hypothesis was to be rejected, then an overall mean change needed to be demonstrated, producing a stronger argument that cognitive content is dependent to some degree on transient mood state. The main downside to this analysis in relation to the present study is that individual affective dimensions are subsumed into overall change in cognitive characteristics between two different time points. This discrete movement in one variable with another discrete movement has been investigated in Studies 1-3 and demonstrated hedonic tone and tense arousal as

two dominate mood dimensions involved. Hence test of difference was chosen as the most appropriate analysis in the present study due to the interest in change scores against the entity of overall negative mood state.

5.3 Results

5.3.1 Descriptive statistics

The minimum and maximum for the UWIST-MACL sub-scales are 8 to 32 for energetic arousal, tense arousal and hedonic tone. The minimum score for anger sub-scale is 5 and the maximum is 20. The results from the present study show a minimum score of 8 to a maximum score of 32 on the three main bipolar, and 5 minimum and 20 maximum on the monopolar scale. Therefore, there is a good range demonstrated on all mood components as measure by the UWIST-MACL. Table 27 presents the means and standard deviations for scores on the UWIST-MACL sub-scales for pre and post mood induction mood induction.

Table 27: Mean and standard deviation scores on the UWIST-MACL sub-scales pre and post mood induction

	Mean	Std. Deviation
Pre mood induction		
Energetic arousal	23.39	4.57
Tense arousal	15.21	6.09
Hedonic tone	27.33	4.68
Anger/frustration	7.91	3.56
Post mood induction		
Energetic arousal	18.94	3.85
Tense arousal	16.39	6.60
Hedonic tone	22.82	6.31
Anger/frustration	8.79	3.99

Table 27 shows the mean the UWIST-MACL scores for participants. Scores on the hedonic tone and energetic arousal scale are negatively related to the level of negative mood (low-scaled scores represent greater negative mood), whereas higher values reflect a greater negative mood on tense arousal and

anger/frustration scales. The post mood induction scores show increased negative mood on each of the four sub-scales of the UWIST-MACL.

Table 28 reports pre and post manipulation means for cued autobiographical appraisals for each of the five outcome variables and as so only reports the effect of mood manipulation for overall sample. The separate analysis is reserved for explanatory variables between predictor mood component variables and there effects on each outcome variable on the cue autobiographical memory appraisals. Table 28 presents the means and standard deviations for the cued autobiographical questionnaire pre and post mood induction. The minimum score was 1 and the maximum score was 7 on each of these self-rating Likert scales. Table 28 represents the mean score over the eleven cued memories on each of the five outcome variables for participants' appraisals. Therefore the minimum score is 1.00 and the maximum score is 7.00 for each participant. Typical scores range from 1.09 to 7.00, rumination ranges from 1.73

Table 28: Mean and standard deviation scores on the five outcome measures within the Cued Autobiographical Questionnaire

	Mean	Std. Deviation
Pre mood induction		
Typical	4.89	1.06
Rumination	4.39	0.79
Valence	5.12	0.86
Other people	5.26	0.97
Expected	5.08	1.01
Post mood induction		
Typical	4.62	1.23
Rumination	4.42	0.97
Valence	4.96	1.29
Other people	5.69	0.83
Expected	4.74	1.23

to 6.18, valence from 1.73 to 6.60, other people from 2.18 to 6.89 and expected from 1.82 to 7.00. Therefore, there is a good range demonstrated on all the self-

rated measures obtained from the participants on the autobiographical questionnaire.

5.3.2 Inferential analysis

The Statistical Package for the Social Sciences was used for the analysis. The paired sample t-test was used to test the difference between pre and post mood induction scores for each sub-scale on the UWIST-MACL.

5.3.2.1 Manipulation check

The UWIST-MACL was used for subjective evaluation in this study, both as a general indicator of mood state and, more specifically, to evaluate changes in energetic arousal, tense arousal, hedonic tone and anger/frustration. Lowered energetic arousal equals less active and alert. Increased tense arousal is consistent with being more anxious and nervous. Lowered hedonic tone equals loss of interest and diminished pleasure response. Increased anger/frustration is consistent with more emotional feelings of anger and frustration. Table 29a presents paired t-tests in the predictor variables on the UWIST-MACL and sub-scales.

Table 29a: Paired sample t-tests in the predictor variables on the UWIST-MACL

	Pre mood induction		**Post mood induction**			
	Mean	Std. Deviation	Mean	Std. Deviation	t (df)	Sig. (2-tailed)
Energetic arousal	23.39	4.57	18.94	3.85	5.64 (32)	.001***
Tense arousal	15.21	6.09	16.39	6.60	-1.16 (32)	.254
Hedonic tone	27.33	4.68	22.82	6.31	4.76 (32)	.001***
Anger/frustration	7.91	3.56	8.79	3.99	-1.86 (32)	.072

*** significant at the 0.001 level (2-tailed).
** significant at the 0.01 level (2-tailed).
* significant at the 0.05 level (2-tailed).

There was a significant difference between pre manipulation and post manipulation mood ratings on the UWIST-MACL. The results indicate that

energetic arousal and hedonic tone showed significant increase in negative mood ($t(32) = 5.64$, $p < 0.001$) and ($t(32) = 4.76$, $p < 0.001$) respectively. Tense arousal and anger/ frustration showed a non-significant increase in negative mood ($t(32) = -1.16$, $p = .254$, n.s.) and ($t(32) = -1.86$, $p = .072$, n.s.) respectively. These were both in the expected direction but non-significant. The explanation for the result observed with tense arousal may be due to the test-retest effect i.e. tense arousal measures anxiety, which may increase less than expected with retest due to it being a more familiar task and counteracting the effects of the increase in anxiety due to the effects from the mood induction procedure.

5.3.2.1.1 Chi squared to indicate whether vulnerability and being symptomatic were associated or independent

The chi squared statistic was used to indicate whether vulnerability and being symptomatic were associated or independent. Table 29b presents chi squared test in 2 x 2 matrix grid indicating where each participant fell in terms of vulnerability and symptomatology.

Table 29b: Chi squared to indicate whether vulnerability and being symptomatic were associated or independent

	Symptomatic	Non Symptomatic	Total
Vulnerable	5	4	9
Non Vulnerable	4	20	24
Total	9	24	33

$x^2 = 4.991$, df = 1, $p < 0.05$

The predetermined alpha level of significance was 0.05 and chi square statistic was $x^2 = 4.991$, the df is 1 for a 2 *x* 2 grid. This is smaller than the conventionally accepted significance level of 0.05, so the null hypothesis that the two

distributions are the same is rejected. Therefore the researcher can reject the null hypothesis that depressive symptoms are independent of vulnerability (i.e. Depressive symptoms and vulnerability are somewhat associated). The data is non orthogonal as previous history and current depressive symptoms are correlated.

5.3.2.2 Independent sample t-tests between vulnerable and non-vulnerable groups

To examine the differences between vulnerable and non-vulnerable participants, cognitive characteristics were observed under transient negative mood baseline checks using independent samples tests to check for difference before mood manipulation was carried out. Table 30 presents independent samples t-tests between non-vulnerable and vulnerable participants on the cued autobiographical questionnaire and sub-scales.

Table 30: Independent sample t-tests between the vulnerable and non-vulnerable

	Levene's Test for Equality of Variances	t	df	Sig. (2-tailed)
BDI	Equal variances assumed	-2.70	31	0.01**
Typicalness	Equal variances assumed	-1.86	31	0.07
Rumination	Equal variances assumed	-0.81	31	0.42
Valence	Equal variances assumed	0.21	31	0.84
Other	Equal variances assumed	1.10	31	0.28
Expectancy	Equal variances assumed	-0.81	31	0.43

** significant at the 0.01 level (2-tailed).
* significant at the 0.05 level (2-tailed).

The observation of the data suggests that there is no significant difference between cognitive characteristics in the vulnerable and non-vulnerable groups prior to the mood manipulation. Interestingly, there was a significant difference in

BDI scores, with the vulnerable having significantly higher mean BDI scores ($F = 0.01$, $t(31) = -2.70$, $p < 0.01$).

5.3.2.3 Paired sample t-tests on vulnerable and non-vulnerable groups pre and post mood manipulation

There will be a difference between the vulnerable and non-vulnerable cognitive content in that there will be a significant difference in the vulnerable but not the non-vulnerable group. Table 31 presents paired t-tests for vulnerable and non-vulnerable participants on the cued autobiographical questionnaire and sub-scales.

Table 31: Paired sample t-tests on the vulnerable and non-vulnerable between pre and post mood manipulation

Paired mean differences (pre and post mood induction)	t	df	Sig. (2-tailed)
Non-vulnerable			
Typicalness	0.06	23	0.527
Rumination	-0.44	23	0.665
Valence	0.30	23	0.766
Other	-1.26	23	0.221
Expectancy	0.76	23	0.457
Vulnerable			
Typicalness	2.37	8	0.045*
Rumination	0.57	8	0.582
Valence	1.02	8	0.338
Other	-3.99	8	0.004**
Expectancy	2.49	8	0.038*

** significant at the 0.01 level (2-tailed).
* significant at the 0.05 level (2-tailed).

Hypothesis 4.2 (i): there was a significant difference in typicalness in the vulnerable group ($t(8) = 2.37$, $p < 0.05$). This indicates that there was a significant decrease in appraised typicalness post mood induction. This suggests that the events recalled under mood stress have decreased perceptual origin and a decreased number of associated memories that contain reduced colours, perceptual clarity and vividness and contextual information, such as relative

spatial location and temporal order. This suggests reduced specificity and increased over-generalness of memory under mood stress.

Hypothesis 4.2 (iii): there was a significant difference in involvement of other people in the vulnerable group ($t(8) = -3.99$, $p < 0.01$). This indicates that there was a significant increase in the appraised importance of other people post mood induction. This suggests an increase in a set of beliefs, attitudes, and behaviours that pertain to an individual's dependence on others. This indicates an increased tendency under mood stress to focus excessively on seeking approval and attention from others in order to sustain self-esteem.

Hypothesis 4.2 (iv): there was a third significant difference in expectancy in the vulnerable group ($t(8) = 2.49$, $p < 0.05$). This indicates that there was a significant decrease in expectancy post mood induction. This suggests increased difficulties in the ability to conceptualize and judge the likelihood of future events in cued recall. So under mood stress there is decreased ability to weigh up probabilities about the predictive certainty of the future.

5.3.2.4 Independent sample t-tests for symptomatic and non-symptomatic groups pre and post mood manipulation

To examine the differences in symptomatic and non-symptomatic cognitive characteristics on the cued autobiographical questionnaire under transient negative mood, baseline checks using independent samples tests to check for difference before mood manipulation were carried out. Following the example of Levine et al. (2006), participants were categorised into BDI scores of 0-7 as 'non-symptomatic', and scores of 8-12 as indicative of 'symptomatology'. Table 32 (on the next page) shows independent t-tests for the symptomatic and non-symptomatic groups between pre and post mood manipulation.

Table 32: Independent sample t-tests for symptomatic and non-symptomatic groups between pre and post mood manipulation

	Levene's Test for Equality of Variances	t	df	Sig. (2-tailed)
BDI	Equal variances assumed	-9.66	31	0.01**
Typicalness	Equal variances assumed	0.28	31	0.78
Rumination	Equal variances assumed	-0.12	31	0.91
Valence	Equal variances assumed	1.41	31	0.17
Other	Equal variances assumed	-0.01	31	0.99
Expectancy	Equal variances assumed	0.70	31	0.49

** significant at the 0.01 level (2-tailed).
* significant at the 0.05 level (2-tailed).

The observation of the data suggests that there was no significant difference between cognitive characteristics in the symptomatic and non-symptomatic groups prior to the mood manipulation. There was a significant difference in BDI scores, with the symptomatic having significantly higher mean scores on the BDI ($F = 2.50$, $t(31) = -9.66$, $p < 0.01$).

5.3.2.5 Paired sample t-tests for symptomatic and non-symptomatic groups pre and post mood manipulation

There was a significant difference in the cognitive characteristics between the pre-existing symptomatic group but not the non-symptomatic group. Table 33 (on the next page) shows paired sample t-tests for the symptomatic and non-symptomatic groups between pre and post mood manipulation.

Table 33: Paired sample t-tests for symptomatic and non-symptomatic groups between pre and post mood manipulation

Paired mean differences (pre and post mood induction)	t	df	Sig. (2-tailed)
Non-symptomatic			
Typicalness	0.66	23	0.52
Rumination	-0.10	23	0.92
Valence	0.07	23	0.94
Other	-1.54	23	0.14
Expectancy	0.44	23	0.66
Symptomatic			
Typicalness	2.39	8	0.04*
Rumination	-0.24	8	0.81
Valence	1.88	8	0.10
Other	-2.86	8	0.02*
Expectancy	3.30	8	0.01**

** significant at the 0.01 level (2-tailed).
* significant at the 0.05 level (2-tailed).

Hypothesis 4.3 (i): there was a significant difference in typicalness in the symptomatic group ($t(8) = 2.39$, $p < 0.05$). This indicates that there was a significant decrease in appraised typicalness post mood induction. This suggests that the events recalled under mood stress have decreased perceptual origin and a decreased number of associated memories. This suggests that there is a reduced specificity and increased over-generalness of memory under mood stress.

Hypothesis 4.3 (iii): there was a significant difference in involvement of other people in the symptomatic group ($t(8) = -2.86$, $p < 0.05$). This indicates that there was a significant increase in appraised importance of other people post mood induction. This suggests an increase in a set of beliefs, attitudes, and behaviours that pertain to an individual's dependence on others under mood stress.

Hypothesis 4.3 (iv): there was a significant difference in expectancy in the symptomatic group ($t(8) = 3.30$, $p < 0.01$). This indicates that there was a significant decrease in expectancy post mood induction. This suggests increased difficulties in the ability to conceptualize and judge the likelihood of future events in cued recall under mood stress.

To summarise, the paired sample t-test indicated an overall significant difference between pre and post mood induction procedure in typicalness, other people and expectancy in the symptomatic and vulnerable. The present study was looking at overall mood change related to negative mood rather than specific negative mood components as in Studies 1-3. The result from this study suggests that these cognitive characteristics in the symptomatic and vulnerable were responsive to changed transient mood state. This was not the case for the same cognitive characteristics in non-symptomatic and non-vulnerable participants under transient mood state. The overall findings from this study suggest that differences exist between vulnerable and non-vulnerable and symptomatic and non-symptomatic which were only observable in primed negative mood state. The evidence from this study supports theory that, in addition to vulnerability or symptomatic mood, a current negative mood state is a necessary condition to measure and observe a change in cognitive content.

5.4 Discussion

The study described here was designed to explore the effects of mood manipulation on the cognitive content of cued autobiographical memories in those with vulnerability or depressive symptomatology. Segal, Williams, Teasdale, & Gemar (1996) & Teasdale & Barnard (1993) suggest that there is an increased risk of reactivation of negative cognitions with vulnerability and increased depressive symptoms. The differential activation hypothesis (Teasdale, 1988) indicates that in negative mood states there will be a difference between vulnerable and symptomatic groups compared with non-vulnerable and non-symptomatic groups. The hypothesis suggests that accessibility of autobiographical memories as a consequence of negative mood reactivates

associated or similar representations that have been previously associated with that mood state (Teasdale, 1988). The evidence from this study supports theory that the vulnerable or symptomatic and negative mood state is a necessary condition to measure and observe a change in autobiographical content.

The evidence supports previous research by Miranda & Persons (1988) and Roberts & Kassel (1996) which suggests that cognitive content is related to mood in vulnerable individuals but not in the non-vulnerable group. Miranda & Persons (1998) did test the hypothesis that latent negative cognitions are present in the vulnerable and require low mood to activate the cognitive content. The interpretation was that induced negative mood seems to facilitate or prime associated cognitive content. Miranda & Persons (1998) suggest that while mood primes or facilitates the change in cognitive content, it does not seem to work for those individuals who have never been depressed.

5.4.1 Vulnerable and non-vulnerable

The key finding in the present study suggests that vulnerable and non-vulnerable individuals have different specificity of cognitive content following a mood induction procedure. This supports Hypothesis 4.2 that there would be a difference between the vulnerable and the non-vulnerable. The results suggested that the vulnerable group showed cognitive bias under mood stress, with typicalness showing less perceptual origins, other people being seen as less important, and future events being evaluated as less certain. This supports hypotheses 4.1 & 4.2 (i, iii and iv) that there would be a change in these characteristics. The finding supports the differential activation hypothesis, which suggests that patterns of cognitive characteristics activated in negative mood state will determine whether that state remains transient or becomes more enduring in vulnerable individuals.

The findings are congruent with previous empirical research (Miranda et al., 1998; Miranda and Persons, 1988; Segal et al., 1999) which reports significant correlations between cognitive reactivity in vulnerable participants but not in non-

vulnerable, in those experiencing similar levels of negative mood. The vulnerable individuals, as in the present research, are those vulnerable to depressed mood by virtue of a previous depressive illness. These individuals may have particular cognitive characteristics that are triggered by negative mood state and influence their cognitive processes, leading them to interpret ambiguous situations as negative and to regard representations of events and others in a biased way. The evidence from the present study suggests that vulnerable people do show changes in cognitive operations under transient low mood, while non-vulnerable people show increased negative mood without the change in cognitive characteristics.

There is a difference between the vulnerable and non-vulnerable where cognitive content is concerned. Three aspects showed a significant difference in cognitive content in the vulnerable but not the non-vulnerable. There is some evidence of reduced specificity in that there was a decrease in typicalness, suggesting decreased perceptual origin and decreased clarity and vividness of associated memories. This indirect measure of overgeneral memory under mood stress is evident for the vulnerable but not the non-vulnerable group post mood manipulation. There is enough evidence from the present study to accept Hypothesis 4.2 (i, iii and iv).

5.4.2 Symptomatic and non-symptomatic

The result from this study suggests that stable symptomatic mood over the previous two weeks differentially activates certain cognitive characteristics under transient mood stress. The participants who were reporting initial symptomatic states over the previous two weeks showed no significant difference in cognitive characteristics pre manipulation but went on to demonstrate significant change in cognitive appraisals post mood manipulation. The finding supports the differential activation hypothesis (Gotlib and MacLeod, 1997; Williams et al., 1997), indicating that patterns of cognitive characteristics activated in negative mood state (Teasdale, 1983 & 1988) happen differentially in those with symptomatic

states over the previous two weeks. This suggests that symptomatology is an important factor in the effect of mood state on retrieved autobiographical content.

The second key finding in the present study suggests that symptomatic and non-symptomatic individuals have different specificity of cognitive content following a mood induction procedure. This supports Hypothesis 4.3 that there would be a difference between the symptomatic and the non-symptomatic. The results suggested that the symptomatic group showed a change in cognitive content under mood stress, with typicalness showing less perceptual origins, other people being seen as less important, and future events being evaluated as less certain. This supports hypotheses 4.1 & 4.3 (i, iii and iv) that there would be a change in these characteristics. There is a suggestion of reduced specificity in that a decrease in typicalness was observed, suggesting a decrease in the clarity and vividness of associated memories. This indirect measure of overgeneral memory under mood stress is evident for those reporting symptomatic states over the previous two weeks but not the non-symptomatic group post mood manipulation. This suggests reduced specificity and increased overgeneral memory under mood stress for the symptomatic group but not the non-symptomatic group. There is enough evidence to accept Hypothesis 4.3 (i, iii and iv) that symptomatic versus non-symptomatic do show changes in cognitive processes under transient low mood.

The findings in this section might be down to those reporting symptomatic states over the previous two weeks being those participants who might be more likely to report being vulnerable (previously depressed). The correlation between the BDI and vulnerable measures demonstrated a positive correlation, suggesting that this could be a possible confound in the interpretation of the observed data. To test whether a combined effect between vulnerability and symptomatic states was influencing the results, univariate analysis was undertaken. The univariate analysis suggested that there was no combined effect on the observed change scores for each of the cognitive characteristics on the cued autobiographical questionnaire. This finding suggests that there was no added effect by the

inclusion of those individuals who had a symptomatic state over the previous two weeks.

5.4.3 Conclusion

The present findings are congruent with previous studies by Miranda et al. (1998), Miranda & Persons (1988), and Segal et al. (1999), which report a significant correlation between cognitive reactivity in vulnerable participants but not in non-vulnerable participants in temporary negative mood. Similarly, the present findings are congruent with previous research by Gotlib & MacLeod (1997) and Williams et al. (1997) indicating that patterns of cognitive characteristics activated in negative mood state differ in symptomatic participants and non-symptomatic participants (Teasdale, 1983 & 1988).

The results suggest that it is transient mood state combined with previous vulnerability or current symptomatology which seems to be important in producing cognitive reactivity. Cognitive reactivity seems to act differentially in these populations. This would account for the change in typicalness, support from other people and endorsements on future expectancy. This supports Hypothesis 4.1 (i, iii and iv) that there would be a difference in cognitive characteristics. The presence of vulnerability seems to increase cognitive reactivity and increase access to certain cognitive characteristics (hypotheses 2 i, iii and iv in section 5.1.1).

The presence of a previous history seems to demonstrate a slight increase in rumination in the vulnerable in negative mood state rather than the observed decrease in the non-vulnerable. This, along with the observed decrease in typicalness, suggests a decrease in clarity and vividness in associated memories. This indirect measure of overgeneral memory in negative mood state was evident for those reporting vulnerability but not the non-vulnerable group. The overgeneral memory could account for the changes in cognitive characteristics in negative mood state. The symptomatic demonstrated a similar decrease in typicalness, indicating an increase in overgeneral memory in

negative mood state for the symptomatic group but not the non-symptomatic group. The presence of symptomatology also seems to increase cognitive reactivity and increase access to certain cognitive content (Hypothesis 3 i, iii and iv in section 5.1.1).

The present research has highlighted that self-focused memories in the symptomatic and the vulnerable are acting as potential moderators in cueing autobiographical content in negative mood state. The present research has also highlighted that there is change in autobiographical cognitive content in the vulnerable and the symptomatic, but has not distinguished between the effects of cognitive reactivity versus the effects of overgeneral memories. Given the evidence from this study and its limitations, it was considered fruitful to examine specifically overgeneral memories that occur within the retrieved autobiographical memories in the vulnerable and the symptomatic in the same study. It was thought that overgeneral memories might be present in the vulnerable and the symptomatic due to the effects of self-focused rumination and targeted memory search rather than activation of latent cognitive content. This was consequently addressed in the next study.

CHAPTER 6

STUDY 5: Autobiographical memory responsiveness to an induced negative mood state: Self-focused overgeneral memories in those self-reporting vulnerability or depressive symptoms.

6.1 Introduction

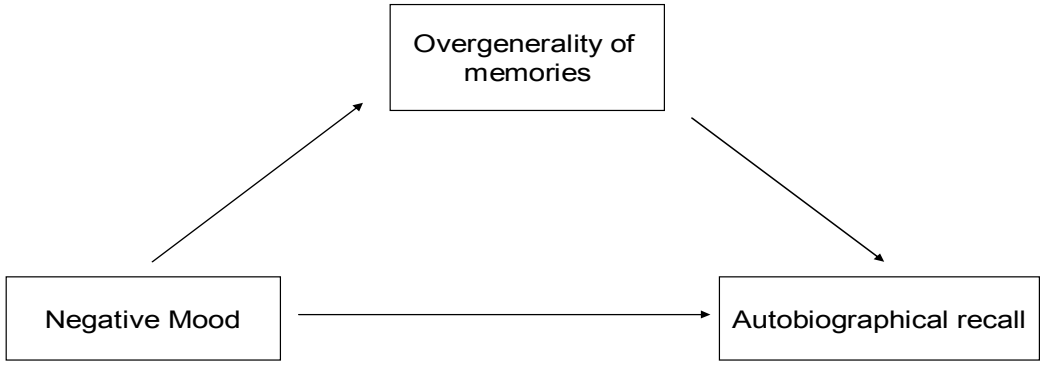
Study 4 found that autobiographical retrieval showed non-diffuse reactivity in vulnerable and symptomatic groups compared to the diffuse reactivity in those non-vulnerable and non-symptomatic. A similar pattern of non-diffuse cognitive reactivity was observed in cognitive content in both vulnerable and symptomatic groups. This pattern was not repeated in the content for non-vulnerable and non-symptomatic groups. Overall, the vulnerable and symptomatic group showed a non-diffuse negative bias in cognitive reactivity.

The present study builds on this initial evidence for low mood affecting autobiographical retrieval by examining whether memory generality following a negative mood induction procedure is sensitive to mood change in self-focused memories. Self-focused attention has been associated with increased cognitive reactivity and overgeneral memory (Chentsova-Dutton & Tsai, 2010). In the present study, the researcher sought to add to the literature by looking at autobiographical memories in vulnerable and symptomatic groups to determine the effects of negative mood on autobiographical memory specificity. The focus in the present study, as in Study 4, was observing the entity of negative mood state rather than individual negative mood components, which were studied previously in Studies 1-3.

There is evidence linking overgeneral memory and autobiographical recall of content (Yeung et al., 2006). Overgeneral memory focuses on cognitive processes involved in memory retrieval and reduced memory specificity (Raes et al., 2007). It is thought that overgeneral memories can change cognitive

characteristics by increased recall of categoric content (Williams et al., 2007; van Vreeswijk & de Wilde, 2004). Overgeneral memories are known to be relapse markers for depression (Brittlebank et al., 1993), which might represent a possible moderating factor for autobiographical content. Overgeneral memories were operationally defined as a moderator variable as it might be helpful in explaining the strength of the relationship that exists between mood and cued autobiographical memory. Yeung et al. (2006) suggest that overgeneral memory is multifaceted, with some facets being mood state dependent and other facets being a stable function of depression. Figure 7 shows the potential for overgeneral memories acting as a moderator on mood state affecting autobiographical recall.

Figure 7: Overgenerality as a moderator in symptomatic and vulnerable groups



To date, however, little research has investigated the effects of mood state and moderating factors on cued autobiographical content. Therefore the present study turns its attention to overgenerality of memories, a factor that might be implicated in mood state effects on autobiographical recall.

6.1.1 Theoretical background

There is consistent evidence of the role of depression, as a clinical category, biasing cognitive functioning, such as ability to retrieve specific autobiographical memories, but it is unclear what other factors mediate this phenomenon. Research into overgeneral memory suggests that the lack of specificity in autobiographical memory remains once the severity of depressive symptoms declines, which indicates that overgeneral memory is not a mood state dependent phenomenon but a trait-like marker (Williams, 1996). It is interesting to note that other cognitive functioning such as biases in recalling negative events and self-evaluation seem to be mood state dependent and return to normal with remission from depression (Persons & Miranda, 1992; Segal & Ingram, 1994).

The sparse research that directly addresses the effects of induced mood on overgeneral memory may represent more about past history of depression or on-going clinical mood disorders rather than temporary mood state because of the tendency of previous research to focus on these areas. However, temporary mood state could possibly be an important variable that could be influenced by or mediated by the presence of vulnerability or depressive symptomatology. The first study by Maccallum et al. (2000) manipulated current mood in a non-clinical group by hypnotically inducing negative mood, and found increased overgeneral memories relative to induced neutral or positive mood states. Similar findings by Svaldi & Mackinger (2003) indicate increased overgeneral memories after a musical mood induction procedure combined with remembering and focusing on negative autobiographical events. Yeung et al. (2006) used both musical and film mood induction procedures to induce neutral, positive and negative mood, and found that overgeneral memory increased following the negative mood induction.

However, the study by McBride & Cappeliez (2004) used the Velten procedure to instill an elated and depressed mood in participants, but found no increase in overgeneral memories within the group. The studies to date have used the

standard autobiographical memory test to measure overgeneral memory, and only Yeung et al. (2006) controlled for current and past levels of depression. The studies have also used limited proxy for measuring mood and emotion by employing visual analogue scales to measure 'happiness' and 'sadness', as in Yeung et al. (2006). While these analogue scales measure mood on a unipolar dimension and provide a good approximation, they may lack the comprehensiveness of recent mood scales, which measure mood on two dimensions as used in the present research. The UWIST-MACL measures emotional state along two dimensions: 'valence', which indicates how pleasant or unpleasant the emotion is, and 'arousal', which measures how activated or deactivated the participant is in that emotion.

The equivocalness as to whether overgeneral memory is a function of mood state may be down to a number of possible explanations as put forward by Yeung et al. (2006). They suggest that overgeneral memory is multifaceted, with some facets being mood state dependent and other facets being a stable function of depression. Alternatively, it could be that positive results are a function of a vulnerability to or a history of depression. The explanation for this is that the induction of negative mood could be differentially increasing overgeneral memories in the vulnerable via the negative mood state as suggested by the differential activation hypothesis (Lau, Segal & Williams, 2004). The differential activation hypothesis suggests that the first episode of depression establishes changes in cognitive modes (Segal et al., 1996) and establishes a link between these cognitive modes and mood state in following episodes of negative mood. Once recovered, the individuals will be vulnerable to the same cognitive characteristics and will be reactivated by negative mood which triggers previous cognitive modes established during the first episode of depressed mood (Williams et al., 1997).

The multifaceted account and the alternative explanation of overgeneral memory being a function of depression or previous episode of depression provide credible accounts for the observed data. It could also be that mood directly accounts for

overgeneral memory. It could be that previous research looking at overgeneral memory has not found a link with temporary induced mood states because of various methodological reasons. Raes et al. (2007) note that previous research has almost exclusively used the Autobiographical Memory Test to measure overgeneral memory in depressed and formerly clinically depressed groups. The Autobiographical Memory Test surprisingly leads to a very low frequency of overgeneral memories in student populations, who would normally be expected to achieve higher levels of overgeneral memory given the incidence of depression in this population (Raes et al., 2007). This finding could be down to the autobiographical memory test administration, which provides extensive instructions, practice trails and repeated prompting for specificity. This could result in individuals with a propensity to retrieve memories in an overgeneral manner still being able to obtain high specificity scores because of the explicitness of the cognitive task that is being administered.

6.1.2 Sentence Completion for Events from the Past Test

The recently developed Sentence Completion for Events from the Past Test (SCEPT; Raes et al., 2007) to assess overgeneral memory was developed to increase sensitivity in non-clinical populations. The SCEPT is an alternative to the cued autobiographical memory paradigm for assessing overgeneral memory in non-clinical populations (Raes et al., 2007). Participants are instructed to provide continuations to the eleven incomplete sentences. Afterwards, the researcher codes each response into specific and overgeneral memories. The test as mentioned does not provide explicit prompts for specific memories, and hence relies on the increased implicitness of the task to increase the likelihood of collecting automatic responses rather than conscious ones from participants.

This study investigated the possible increased sensitivity of the sentence completion method to assess overgeneral memory over the cued autobiographical method. The rationale for expecting increased sensitivity in measuring overgeneral memories was that the sentence completion method would elicit more automatic responses rather than conscious ones from

participants than the cued autobiographical technique. The other reason for the expectation was that the sentence completion method is related to personal semantic events compared to the free recall cued autobiographical method, which may inadvertently focus on generic categoric rather than personal semantic information.

The present study examined whether overgeneral memory could be induced in a non-clinical population using a negative mood manipulation. This would be of interest as overgeneral memory has been suggested to be a stable trait-like marker. The expectation from findings and observations in Studies 1-4 within this thesis is that cognitive characteristics do vary with mood state. The current research aimed to extend the understanding of the relationship between transient mood and overgeneral retrieval.

6.1.3 Purpose of the study

This study sought to understand the effect of negative mood on memory specificity within self-focused autobiographical memories in those self-reporting vulnerability or depressive symptoms. The idea of the present study was to evoke self-focused memories by asking participants to complete sentence stems for events from the past test to assess overgeneral memory (SCEPT; Raes et al., 2007). The test does not provide explicit prompts for specific memories, and hence relies on the implicit nature of the task to increase the automatic responses. The rationale for using the sentence completion task is related to its target of personal semantic events in contrast to the free recall autobiographical method used hitherto in the present research, which could inadvertently focus on generic categoric rather than personal semantic information.

To address the general aim of how mood affects autobiographical retrieval, participants rated a number of characteristics, which the individual endorsed on an analogue scale. The endorsements were observed pre and post mood induction, and overall mood was measured with the UWIST-MACL (Matthews et

al., 1990). The general aim was propagated in response to the lack of research investigating how mood affects the recalled content retrieved in autobiographical memories. Furthermore, by examining the influence of vulnerability and its effects on accessibility of the cognitive products it was hoped to elucidate the importance of previous history and depressive symptomatology in the presence of temporary mood state. There appears to be little research available to demonstrate how overgeneral memory and cognitive products are influenced by current negative mood in those self reporting vulnerability or depressive symptoms in one study.

The present study employed a non-clinical sample to examine the mean difference in change scores at t1 and t2 of autobiographical memory content whilst examining the influence of vulnerability and depressive symptomatology. A sample of students underwent a sentence completion test focusing on the memory appraisal before and after a negative mood induction procedure. The content held within autobiographical memory may be affected by such negative mood shifts.

In summary, the influence of negative mood on autobiographical memory appears to be generally consistent with the expectations in this section; negative mood may result in overgeneral memories. The characteristic of overgenerality may be more pronounced in individuals with vulnerability and depressive symptomatology. The present research investigated overall mood as measured by the UWIST-MACL and its effects on both content-based attributes and memory changes on the free recall of sentence stems in those with a previous history of depression and those with depressive symptomatology. The categoric and personal semantic aspects of autobiographical memory highlighted have emerged from research (Raes et al., 2007) and opened up further questions on the effects of negative mood state on autobiographical retrieved content.

The present study was designed to address two areas of uncertainty concerning mood effects on autobiographical retrieval:

(a) Is autobiographical retrieval reactive to the personal semantic nature of the memory stems?

(b) Is there a change in specificity of autobiographical memories between those self-reporting vulnerability or non-vulnerability and in those self-reporting depressive symptoms or no depressive symptoms?

$H_{5.1}$ It was hypothesised that negative mood would predict a change from pre to post mood induction in the endorsements in specific memories (Williams et al., 2007).

$H_{5.2}$ It was hypothesised that negative mood would predict a change from pre to post mood induction in the endorsements of overgeneral autobiographical memories (van Vreeswijk & de Wilde, 2004).

$H_{5.3}$ It was hypothesised that there would be a difference between the vulnerable and non-vulnerable endorsements for the characteristics in 1 and 2 above (Gibbs & Rude, 2004; Hipwell, Sapotichne, Klostermann, Battista & Keenan, 2011)

$H_{5.4}$ It was hypothesised that there would be a difference between the symptomatic and non-symptomatic endorsements for the characteristics in 1 and 2 above (Yeung et al., 2006).

6.2 Method

6.2.1 Participants

The participants were made up of 34 student volunteers from the University of Chester, providing reasonable power for statistical and correlational analysis. Students in the present study had not participated in the previous studies. The students were recruited from the Faculty of Health and Social Care. Participants were recruited in groups of approximately twelve and underwent the group

procedure (detailed in the procedures section). 8 participants were excluded for their own protection on the basis of their high BDI-2 score (see section 2.2.3 for ethical procedure and support offered to all participants). A power calculation was conducted on GPOWER, a general power analysis program (Erdfelder et al., 1996). Sample size of 34, with alpha level set at p = 0.05, a large effect size (r = 0.5), gives 95% power to detect real difference due to treatment effect rather than chance. Ethical approval was granted by the Psychology Departmental Ethics Committee prior to data collection, and ethical approval for access to students was granted from the Faculty of Health and Social Care Ethics Committee before recruitment of participants.

6.2.2 Materials and measures

The measures administered were the same as detailed in Study 4, with the exception of the substituted SCEPT measure for overgeneral memory instead of the CAMQ for cognitive content. The Sentence Completion for Events from the Past Test (SCEPT; Raes et al., 2007) was designed to assess overgeneral memory in a non-clinical population. This sentence completion procedure comprises eleven sentence stems probing for past experiences (Appendix 10). The SCEPT is an alternative to the cued autobiographical memory paradigm for assessing overgeneral memory in a non-clinical population (Raes et al., 2007). Participants were instructed to provide continuations of the eleven incomplete sentences. The researcher coded the responses on a continuum from semantic associates to specific memories. The predictor and outcome variables were defined and are listed in Table 34 (on the next page).

The outcome variables are obtained from the Sentence Completion for Events from the Past Test. The responses are coded by the following categories: semantic associate (referring to personal overgeneral semantic information), categoric memory (referring to a category of similar, repeated events), extended memory (referring to an extended period of time), specific memory (referring to a single personal event not longer than a day).

Table 34: List of predictor and outcome variables

Independent/predictor/ explanatory Variable(s)	Dependent/outcome Variable(s)
The University of Wales Institute of Science and Technology Mood Adjective Checklist (UWIST-MACL)	*Sentence completion for Events from the Past Test (SCEPT)*
	SCEPT
	Overgeneral category
Energetic Arousal (EA)	Specific category
Tense Arousal (TA)	Semantic associates
Hedonic Tone (HT)	Categoric memories
Anger/frustration (AF)	Extended memories
	Specific memories

6.2.3 Procedure

The same procedure was followed as detailed in Study 4, with the exception of the inclusion of the sentence completion procedure instead of the Cued Autobiographical Memory Questionnaire. The sentence completion procedure was administered without the explicit instruction to focus on specific memories as in Study 4. Participants were instructed to provide continuations to incomplete sentence stems. The sentence stems were coded using the following coding categories as reported in Raes et al., 2008 page 750-751: semantic associate (referring to personal overgeneral semantic information; e.g., "…I used to be a very shy girl"), categoric memory (referring to a category of similar, repeated events; e.g., "…my grandmother used to play games with me when I was little"), extended memory (referring to an extended period of time; e.g., "…my time in junior high"), specific memory (referring to a specific personal past experience that did not last longer than a day; e.g., "…sad I was the day my grandfather died"), and omission. The content of autobiographical memories were quantitatively coded as semantic associates scored (1), categoric memories scored (2),

extended memories scored (3), specific memories scored (4) and omission. The mean score was taken over the 11 sentence stems. The assignment of scores 0 - 4 to each sentence stem was discussed with a colleague and followed the same procedure detailed by Raes et al., 2008 which demonstrated easy assignment of categories to sentence stems. Good inter-rater reliability was shown by Raes et al., 2007 as 87%, K% 0.82.

6.2.4 Design and analysis strategy

Design and analysis followed the same procedure as detailed in Study 4, with the exception that the outcome variable was the autobiographical memory which was measured by the Sentence Completion for Events from the Past Test (SCEPT; Raes et al., 2007) instead of the Cued Autobiographical Memory Questionnaire (CAMQ; adapted version of the Autobiographical Memory Test by Williams & Broadbent, 1986). The analysis involved t-tests as in Study 4 due to the insights already gained from Studies 1-3. The focus in the present study was observing and measuring the change scores against the entity of negative mood state rather than individual negative mood components, which were reported in Studies 1-3.

6.3 Results

6.3.1 Descriptive analysis

The minimum and maximum for the UWIST-MACL sub-scales are 8 to 32 for energetic arousal, tense arousal and hedonic tone. The minimum score for anger sub-scale is 5 and the maximum is 20. The results from the present study show a minimum score of 8 to a maximum score of 32 on the three main bipolar, and 5 minimum and 20 maximum on the monopolar scale. Therefore, there is a good range demonstrated on all mood components as measured by the UWIST-MACL. Table 35 (on the next page) presents the means and standard deviations for scores on the UWIST-MACL sub-scales for pre and post mood induction.

Table 35: Mean and standard deviation scores on the UWIST-MACL sub-scales pre and post mood induction

	Mean	Std. Deviation
Pre mood induction		
Energetic arousal	22.29	4.17
Tense arousal	14.91	4.04
Hedonic tone	26.85	3.68
Anger/frustration	7.24	2.82
Post mood induction		
Energetic arousal	19.97	5.53
Tense arousal	15.76	4.53
Hedonic tone	23.76	4.70
Anger/frustration	9.15	4.08

Table 35 shows the mean the UWIST-MACL scores for participants. Scores on the hedonic tone and energetic arousal scale are negatively related to the level of negative mood (low-scaled scores represent greater negative mood), whereas higher values reflect a greater negative mood on tense arousal and anger/frustration scales. The post mood induction scores show increased negative mood on each of the four sub-scales of the UWIST-MACL.

Table 36 (on the next page) presents the means and standard deviations for scores on the sentence completion procedure.

Table 36: Mean and standard deviation scores for the sentence completion procedure

	Mean	Std. Deviation
Pre mood induction		
SCEPT	2.42	0.42
Overgeneral category	5.62	1.95
Specific category	5.21	1.87
Semantic associates	3.06	2.20
Categoric memories	2.56	1.89
Extended memories	2.88	1.47
Specific memories	2.32	1.45
Post mood induction		
SCEPT	2.31	0.45
Specific category	4.41	2.18
Semantic associates	2.79	2.56
Categoric memories	3.59	2.69
Extended memories	2.71	1.64
Specific memories	1.71	1.49

Table 36 above represents the mean score over the eleven cued memories on SCEPT and the five sub-scales. The minimum score on the SCEPT was 1.00 and maximum score 11.00. The minimum score was zero and the maximum score was 11.00 for each of the six sub-scales. The SCEPT scores ranged from 1.00 to 3.18, overgeneral category ranged from 2.00 to 11.00, specific category from 0.00 to 9.00, semantic associate from 0.00 to 11.00, categoric memories from 0.00 to 11.00, extended memories from 0.00 to 11.00 and specific memories from 0.00 to 11.00. Therefore, there is a good range demonstrated on all memory specificity measures.

6.3.2 Inferential analysis

The Statistical Package for the Social Sciences was used for the analysis. The paired sample t-test was used to test the difference between pre and post mood induction scores for each sub-scale on the sentence completion procedure for memories of the past.

6.3.2.1 Manipulation check

The UWIST-MACL was used for subjective evaluation in this study, both as a general indicator of mood state and, more specifically, to evaluate changes in energetic arousal, tense arousal, hedonic tone and anger/frustration. Lowered energetic arousal equals less active and alert. Increased tense arousal is consistent with being more anxious and nervous. Lowered hedonic tone equals loss of interest and diminished pleasure response. Increased anger/frustration is consistent with more emotional feelings of anger and frustration. Table 37a presents paired sample t-tests in the predictor variables on the UWIST-MACL and sub-scales.

Table 37a: Paired sample t-tests in the predictor variables on the UWIST-MACL

	Pre mood induction		**Post mood induction**			
	Mean	Std. Deviation	Mean	Std. Deviation	t (df)	Sig. (2-tailed)
Energetic arousal	22.29	4.17	19.97	5.53	2.46 (33)	.019*
Tense arousal	14.91	4.04	15.76	4.53	-0.99 (33)	.328
Hedonic tone	26.85	3.68	23.76	4.70	3.51 (33)	.001***
Anger/frustration	7.24	2.82	9.15	4.08	-3.42 (33)	.002**

*** significant at the 0.001 level (2-tailed).
** significant at the 0.01 level (2-tailed).
* significant at the 0.05 level (2-tailed).

There was a significant difference between pre manipulation and post manipulation mood ratings on the UWIST-MACL. The results demonstrated that

energetic arousal, hedonic tone and anger/frustration showed significant increase in negative mood ($t(33) = 2.46$, $p < 0.05$), ($t(33) = 3.51$, $p < 0.001$) and ($t(33) = -3.42$, $p < 0.01$) respectively. Tense arousal showed a non-significant increase in negative mood ($t(33) = -0.99$, $p = .328$, n.s.). This was in the expected direction but non-significant. The explanation for the result observed with tense arousal may be due to the test-retest effect i.e. tense arousal measures anxiety, which may increase less than expected with retest due to it being a more familiar task and counteracting the effects of the increase in anxiety due to the effects of the mood induction procedure.

6.3.2.1.1 Chi squared to indicate whether vulnerability and being symptomatic were associated or independent

The chi squared statistic was used to indicate whether vulnerability and being symptomatic were associated or independent. Table 37b presents chi squared test in 2 x 2 matrix grid indicating where each participant fell in terms of vulnerability and symptomatology.

Table 37b: Chi squared to indicate whether vulnerability and being symptomatic were associated or independent

	Symptomatic	Non Symptomatic	Total
Vulnerable	2	8	10
Non Vulnerable	9	15	24
Total	11	23	34

$x^2 = 0.988$, df = 1, $p > 0.05$, non significant

The predetermined alpha level of significance was 0.05 and chi square statistic was $x^2 = 0.988$, the df is 1 for a 2 *x* 2 grid. This is bigger than the conventionally accepted significance level of 0.05, so the null hypothesis that the two

distributions are the same is accepted. Since the x^2 statistic (0.988) did not exceed the critical value for 0.05 probability level (0.988) the researcher can accept the null hypothesis that depressive symptoms are independent of vulnerability (i.e. vulnerability had no effect on depressive symptoms). The result contrasts with the finding from Study 4 chi squared showing depressive symptoms are not independent of vulnerability. The possible reason is the smaller number of participants in the present study who are both vulnerable and symptomatic compared to Study 4.

6.3.2.2 Independent sample t-tests on the sentence completion procedure between the vulnerable and non-vulnerable

To examine the differences in vulnerable and non-vulnerable cognitive characteristics under transient negative mood, baseline checks using independent sample tests to check for difference before mood manipulation were carried out. Table 38 presents the independent samples test between the vulnerable and non-vulnerable on the sentence completion procedure.

Table 38: Independent sample t-tests on the sentence completion procedure between the vulnerable and non-vulnerable (Levene's Test for Equality of Variances)

	t	df	Sig. (2-tailed)
SCEPT	1.29	32	0.21
General category	1.23	32	0.23
Specific category	-1.33	32	0.19
Semantic associates	-1.10	32	0.28
Categoric memories	-0.08	32	0.94
Extended memories	0.98	32	0.34
Specific memories	0.57	32	0.57

** significant at the 0.01 level (2-tailed).
* significant at the 0.05 level (2-tailed).

Observation of the data suggested that there was no significant difference between cognitive characteristics in the vulnerable and non-vulnerable groups prior to the mood manipulation.

6.3.2.3 Paired sample t-tests on the sentence completion procedure between the non-vulnerable and vulnerable pre and post mood manipulation

There was a significant difference in the vulnerable but not the non-vulnerable group in overgeneral memory. Table 39 (on the next page) presents paired sample tests between the non-vulnerable and the vulnerable on the sentence completion procedure.

Table 39: Paired sample t-tests between the non-vulnerable and the vulnerable pre and post mood manipulation

Paired mean differences (pre and post mood induction)	t	df	Sig. (2-tailed)
Non-vulnerable			
SCEPT	1.74	23	0.10
General category	-1.80	23	0.09
Specific category	1.75	23	0.09
Semantic associates	1.12	23	0.27
Categoric memories	-1.53	23	0.14
Extended memories	0.00	23	1.00
Specific memories	1.66	23	0.11
Vulnerable			
SCEPT	4.48	9	0.01**
General category	-4.02	9	0.01**
Specific category	3.21	9	0.01**
Semantic associates	-0.17	9	0.87
Categoric memories	-1.74	9	0.12
Extended memories	1.26	9	0.24
Specific memories	2.54	9	0.03*

** significant at the 0.01 level (2-tailed).
* significant at the 0.05 level (2-tailed).

Hypothesis 5.3: There was a significant difference in total SCEPT in the vulnerable group ($t(9) = 4.48$, $p < 0.01$). This indicates that there was a significant decrease in specificity post mood induction. This suggests reduced specificity and increased overgeneralness of memory under mood stress.

Hypothesis 5.2: There was a significant difference in general category in the vulnerable group ($t(9) = -4.02$, $p < 0.01$). This indicates that there was a

significant increase in semantic associates and categoric memories post mood induction. This suggests that there is an increase in overgeneral memory under mood stress.

Hypothesis 5.1: There was a significant difference in specific category in the vulnerable group ($t(9) = 3.21$, $p < 0.01$). This suggests that there is a decrease in specific category of memory under mood stress. There was a further significant difference in the specific memories in the vulnerable group ($t(9) = 2.54$, $p < 0.05$). This indicates that there was a significant decrease in specific memories post mood induction. This suggests decreased specificity of memory under mood stress.

6.3.2.4 Independent sample t-tests on the sentence completion procedure between symptomatic and non-symptomatic

To examine the differences in symptomatic and non-symptomatic cognitive characteristics on the sentence completion test under transient negative mood, baseline checks using independent samples tests to check for differences before mood manipulation were carried out. Following the example of Levine et al. (2006), participants were categorised into BDI scores of 0-7 as non-symptomatic, and scores of 8-12 as indicative of symptomatic. Table 40 (on the next page) presents independent sample tests between the symptomatic and non-symptomatic on the sentence completion procedure.

Table 40: Independent sample t-tests on the sentence completion procedure between the symptomatic and non-symptomatic (Levene's Test for Equality of Variances)

	t	df	Sig. (2-tailed)
SCEPT	2.00	32	0.054
General category	1.66	32	0.11
Specific category	-1.37	32	0.18
Semantic associates	-1.41	32	0.17
Categoric memories	0.22	32	0.83
Extended memories	0.17	32	0.86
Specific memories	1.99	32	0.054

** significant at the 0.01 level (2-tailed).
* significant at the 0.05 level (2-tailed).

There is no significant difference between cognitive characteristics in the symptomatic and non-symptomatic groups prior to the mood manipulation.

6.3.2.5 Paired sample t-tests on the sentence completion procedure between the non-symptomatic and the symptomatic pre and post mood manipulation

There was a significant difference between the pre-existing symptomatic but not in the non-symptomatic group. Table 41 (on the next page) presents paired sample tests between the non-symptomatic and the symptomatic on the sentence completion procedure.

Hypothesis 5.4: There was a significant difference in total SCEPT in both the non-symptomatic and symptomatic groups ($t(22) = 2.30$, $p < 0.05$ and $t(10) = 3.01$, $p < 0.01$ respectively). This indicates that there was a significant decrease in specificity in both groups post mood induction. This suggests reduced specificity

Table 41: Paired sample t-tests on sentence completion procedure between the non-symptomatic and the symptomatic pre and post mood manipulation

Paired mean differences (pre and post mood induction)	t	df	Sig. (2-tailed)
Non-symptomatic			
SCEPT	2.30	22	0.03*
General category	-2.60	22	0.02*
Specific category	2.15	22	0.04*
Semantic associates	0.45	22	0.66
Categoric memories	-1.45	22	0.16
Extended memories	0.00	22	1.00
Specific memories	1.66	22	0.11
Symptomatic			
SCEPT	3.01	10	0.01**
General category	-2.75	10	0.02*
Specific category	2.43	10	0.04*
Semantic associates	0.70	10	0.50
Categoric memories	-1.75	10	0.11
Extended memories	0.94	10	0.37
Specific memories	3.11	10	0.01**

** significant at the 0.01 level (2-tailed).
* significant at the 0.05 level (2-tailed).

in both the non-symptomatic and symptomatic groups, and increased over-generalness of memory under mood stress.

Hypothesis 5.2: There was a significant difference in general category in both the non-symptomatic and symptomatic groups ($t(22) = -2.60$, $p < 0.05$ and $t(10) = -2.75$, $p < 0.05$ respectively). This indicates that there was a significant

increase in semantic associates and categoric memories in both groups post mood induction. This suggests that there is an increased overgeneral memory in both non-symptomatic and symptomatic groups under mood stress.

Hypothesis 5.1: There was a significant difference in specific category in both the non-symptomatic and symptomatic groups ($t(22) = 2.15$, $p < 0.05$ and $t(10) = 2.43$, $p < 0.05$ respectively). This indicates that there was a significant decrease in extended memories and specific memories in both groups post mood induction. This suggests that there is a decrease in specificity of memory in both non-symptomatic and symptomatic groups under mood stress. There was a further significant difference in the specific memories in the symptomatic group ($t(10) = 3.11$, $p < 0.01$). This indicates that there was a significant decrease in specific memories post mood induction. This suggests decreased specificity of memory under mood stress.

To summarise, the paired samples t-test indicated an overall significant difference between pre and post mood induction procedure in the vulnerable. The vulnerable group showed a significant increase in overgeneral memories. Univariate analysis indicated an increase in overgeneral memories in the vulnerable. Interestingly this was not shown in the non-vulnerable group. The result from this study suggests that these cognitive characteristics in the non-symptomatic and symptomatic are similarly affected by transient negative mood state. Both the non-symptomatic group and the symptomatic group demonstrated a significant increase in generic memories when in negative mood state. Univariate analysis demonstrated a non-significant effect on the increase in overgeneral memories.

6.4 Discussion

This study examined the relationship between negative mood and overgeneral memory. The first analysis suggested that the vulnerable showed a significant increase in overgeneral memories (Hypothesis 5.3). Specifically, an overall reduction in specific memories was seen in the vulnerable group (Hypothesis

5.1). Interestingly, this was not shown in the non-vulnerable group. This supports the differential activation hypothesis (Lau et al., 2004), which indicates that negative mood would differentially increase overgeneral memories in the vulnerable group. The differential activation hypothesis suggests that, unlike the non-vulnerable group, the vulnerable will have latent cognitive characteristics that will be reactivated by negative mood (Williams et al., 1997). The result from the second analysis suggests that the symptomatic and non-symptomatic are similarly affected by transient negative mood state, with both groups demonstrating a significant increase in generic memories (Hypothesis 5.2). Overgeneral memory therefore seems to be a marker of vulnerability of depressive rather than a marker of depressive symptomatology per se.

6.4.1 Vulnerable and non-vulnerable

The key finding in the present study suggests that vulnerable and non-vulnerable individuals have different specificity of memories following a mood induction procedure. This supports Hypothesis 5.3 that there would be a difference between the vulnerable and the non-vulnerable. The evidence from the present study suggests that vulnerable people do show overgeneral recall under transient negative mood state, while non-vulnerable people show no change in specificity of recall. The present findings suggest that mood is an important factor in memory specificity and that changes in specificity occurred under mood stress differentially in the vulnerable group but not the non-vulnerable group. There was an increase in general category memories in the vulnerable when in negative mood state (Hypothesis 5.2). There was also a decrease in specific category memories in the vulnerable when in negative mood state (Hypothesis 5.1). The Gibbs & Rude (2004) study indicates evidence for an increase in overgeneral memories in the vulnerable when in negative mood, and provides supports for a differential activation hypothesis (Teasdale, 1983). The differential activation hypothesis suggests that vulnerable individuals have particular cognitive styles that are triggered by negative mood state and bias their cognitive processes in encoding, storage and retrieval of memory that would have important implications for over general recall. This was supported by a univariate analysis which

suggests that vulnerability as a fixed variable accounted for some of the increase in overgeneral memories ($F = 11.29$, $p < 0.05$). This supports Hypothesis 5.2 that there would be a difference in overgeneral memories.

6.4.2 Symptomatic and non-symptomatic

The second key finding in the present study suggests that symptomatic and non-symptomatic individuals are similarly influenced following a mood induction procedure. This does not support Hypothesis 5.4 that there would be a difference between the symptomatic and the non-symptomatic. This second analysis demonstrated that both non-symptomatic and symptomatic groups showed a significant increase in overgeneral memories and a reduction in specific memories. This demonstrates that current induced negative mood state has an impact on overgeneral memory which is unaffected by depressive symptomatology over the last two weeks. The present findings suggest that transient mood state affects overgeneral memories in both symptomatic and non-symptomatic groups. Both groups demonstrated a significant increase in generic memories when in negative mood state (Hypothesis 5.2). There was also a decrease in specific category memories in both symptomatic and non-symptomatic groups when in negative mood state (Hypothesis 5.1). This is similar to findings by Wessel, Meeren, Peeters, Arntz, & Merckelbach (2001). This was further supported by a univariate analysis in the present study which suggested that symptomatic symptoms over the last two weeks as a fixed variable had a non-significant effect on increase in overgeneral memories ($F = 1.08$, $p = 0.43$, n.s.). LIke the t-test contrast between the symptomatic and non-symptomatic, the univariate analysis does not support Hypothesis 5.4 that there would be a difference in overgeneral memories.

The symptoms of depression reported in the study, as would be expected, were mild and therefore non-clinical. It could reasonably be argued that they would be similarly affected by transient negative mood state. These findings could have been different in a clinically depressive population, such groups having been reported to show increased overgeneral memory compared to the non-depressed

(Moffitt, Singer, Nelligan, Carlson & Vyse, 1994; Sampson, Kinderman, Watts & Sembi, 2003).

6.4.3 Comparative discussion: Studies 4 and 5

Study 4 provided evidence that present cognitive appraisals are differentially effected by transient mood state in the vulnerable vs. the non-vulnerable (Hypothesis 4.2) and the symptomatic vs. the non-symptomatic (Hypothesis 4.3), while the present study suggests that overgeneral autobiographical memory is differentially affected in the vulnerable vs. the non-vulnerable (Hypothesis 5.3) but is undifferentiated in the symptomatic and the non-symptomatic (Hypothesis 5.4) group, but shows increased overgeneral memory in both groups.

The interpretation of the data would suggest that the SCEPT is sensitive to the changes in negative mood state. The reduced specificity seems to be visible in the vulnerable but not the non-vulnerable group. This finding seems to lend support for the differential activation hypothesis. It was further demonstrated that the SCEPT was able to assess reduced specificity in both the symptomatic state and non-symptomatic group under transient mood stress. Hitherto, the literature suggests this phenomenon was present in the depressed and previously depressed while in the never depressed it was absent (Mackinger et al., 2000; Nandrino, Pezard, Poste, Reveillere & Beaune, 2002). The present finding that it is present in both the symptomatic and the non-symptomatic under mood stress might suggest that SCEPT as an instrument in measuring overgeneral memory is more sensitive than traditional measures of overgeneral memory as suggested by the authors (Raes et al., 2007).

Making sense of the results would suggest that it is transient mood state and vulnerability rather than presence of symptomatology that are likely to be important in moderating overgeneral memories. The presence or absence of symptomatology did not affect the associated overgeneral memory seen in negative mood state. The finding was that the non-vulnerable in negative mood state showed no overgeneral memory but retained memory specificity. This

would account for the presence of overgeneral memory after remission for depression in which symptomatology has gone but vulnerability for depression ensues. It would also answer the question why overgeneral memory can be induced in both clinical and non-clinical populations (Raes et al., 2007). Overgeneral memory acts differentially in the vulnerable i.e. those with a previous history of depression.

The interpretation of the comparative procedure with the CAMQ suggests that cognitive characteristics under investigation are sensitive to the changes in transient mood. The observed changes in cognitive characteristics were visible in the vulnerable but not the non-vulnerable group. The interpretation is that induced negative mood seems to facilitate or prime certain cognitive characteristics selectively in the vulnerable. This finding seems to lend support for the differential activation hypothesis. It was further demonstrated that the CAMQ was able to assess changes in cognitive characteristics in the symptomatic but not the non-symptomatic group under transient mood stress. This finding contrasts with the SCEPT, which has a focus on overgeneral memory, rather than cognitive reactivity in CAMQ.

6.4.4 Conclusion

It would seem likely that the SCEPT is directly assessing overgeneral retrieval, while the CAMQ is predominantly assessing broader cognitive characteristics within autobiographical memory. It would also seem that CAMQ is assessing broader cognitive characteristics which imply increased or reduced reactivity of those operations following mood manipulation. The SCEPT would seem to be focusing on cognitive processes and memory specificity involved in memory retrieval. It is also likely that the SCEPT and CAMQ are both tapping into automatic responses, as opposed to strategic. However, it would seem likely that the CAMQ is focusing on cognitive operations rather than cognitive processes. Ingram et al. (1998) define cognitive operations as the way individuals deal with negative mood and focus on important cognitive changes that take place under mood stress. Cognitive operations focus on shifts in attention, rumination, self-

evaluation and future predictions, whereas cognitive processes focus on how information is encoded, altered, combined and stored in memory (Hollon & Garb, 1988).

The present research has highlighted that overgeneral memories might be acting as a potential moderator in cued autobiographical content. It would seem that negative mood might serve to activate the depressive content with the increased endorsement of certain cognitive characteristics. Some cognitive processes dominate during the presence of depressive symptoms, such as increased access to negative automatic thoughts or cognitive biases, and others seem to endure when non-symptomatic but persist in those with a previous history, such as increases in overgeneral memory style. The suggestion is that mood state effect on autobiographical content and memory is multifaceted, with some facets being mood state dependent and other facets being a stable function of vulnerability to depression.

CHAPTER 7
GENERAL DISCUSSION

7.1 Introduction

This thesis now turns to the discussion of the research presented in the previous empirical chapters. The present research investigated the autobiographical responsiveness to negative mood state in terms of cognitive content and overgeneral memories. In the previous five chapters, the findings from the separate studies were discussed and interpreted separately in the light of the relevant literature. The purpose of the present chapter is to discuss the studies as a whole, to draw general conclusions and discuss implications for theory and practice. The key findings are summarised and theoretical and practical implications of these findings are discussed following each study. This is followed by a consideration of methodological limitations, and a number of suggestions for future investigations which expand on the present research are discussed.

The present research studies were aimed at addressing the question of whether autobiographical recall is affected by negative mood state and at suggesting what factors other than mood might mediate the mood state effects in memory recall. Specifically, the present research investigated which components of negative mood state determined a change from pre to post mood induction in the cued autobiographical memory. Two main theories to be discussed are Bower's (Bower 1981) associative network theory and the Beck et al. (1979) schema theory. The first theory suggests that accessibility of the cognitive products emerging from autobiographical retrieval are intrinsically in an associative network joining memory and mood. This theory would predict that mood change will result in autobiographical memory biases in a congruent direction with the induced mood. An alternative way to understand the accessibility of the cognitive products from autobiographical recall is by the Beck et al. (1979) schema theory, which suggests that latent cognitive aspects from previous episodes of depression are activated by mood states, and further suggests that temporary mood change would have little effect in the absence of stable trait-like

vulnerability in terms of a previous history of depression or current depressive symptoms. This latter theory indicates that cognitive reactivity is to do with some aspect of the depressive syndrome.

The purpose of the present research series was to test the relationship between negative mood and its effect on autobiographical recall, including the relative accessibility of cognitive content, so-called cognitive reactivity and generality of memory in a non-clinical population. The series of studies is also designed to build insight in relation to one another and to bring together the various factors involved. The research was unique in three respects. Firstly, Studies 1-3 investigated four different mood variables as measured by the UWIST-MACL: energetic arousal, tense arousal, hedonic tone and anger/frustration (Matthews et al., 1990). Studies 1 - 3 to an extent were exploratory, because there was some evidence on the effects of depressed mood, but less evidence on the effects of individual negative mood components on autobiographical retrieval. A number of emotional aspects of autobiographical content formed the focus of Study 1, while Studies 2 and 3 looked at cognitive aspects of autobiographical content. The second unique aspect to the research was that symptomatology and vulnerability were investigated in Studies 2 and 3 respectively as moderators. Studies 4 - 5 contrast with the exploratory nature of studies 1 – 3, which investigated individual mood components rather than overall negative mood change as in studies 4 -5. The t – test was used in studies 4 - 5 to investigate overall mood change rather than exploratory correlational analysis which was used to investigate the individual negative mood components. Finally, the third unique aspect was that autobiographical aspects were looked at from the emotional and cognitive content in Studies 1-4 and of memory generality in Study 5.

Study 1 investigated autobiographical sensory and emotional aspects following a negative mood induction. A manipulation check supported the validity of the experimental procedure as a means to induce a negative mood response. Miranda & Persons (1998) argued that internal mood states, as well as external

events, might facilitate or inhibit autobiographical processes. The question asked was whether there is a transitory mood effect on sensory and emotional aspects, such as feelings and emotions, attached to memories. This was done by looking at evaluative judgements on feelings and emotions attached to memories rather than specific cognitive content, which was the focus of the following series of studies.

The hypothesis that change in mood would result in changes in evaluative judgements yielded some support. The key significant change was the evaluative judgement of emotionality, which showed significant negative correlations with energetic arousal and hedonic tone. The dimension of energetic arousal indicates decreased psychomotor activities, while hedonic tone is associated with affective mood state indicating increased negative affective tone. This supports Hypothesis 1.3, which suggested that there would be a difference in emotional intensity. This suggests that negative mood may be influencing autobiographical retrieval and its consequent appraisal. The external detail and the appraisal are seen as autobiographical memory content. The relationship is possibly bidirectional as suggested by Oei et al. (2005). This means that mood may effect autobiographical retrieval and, in turn, effect the appraisal and content which, in turn, may effect further autobiographical retrieval. The terms content and appraisal have been used in the present research. The content can be defined as either external detail or an appraisal of the detail in the recalled memory (Bokhari, 2011). External detail includes time, place and person. The appraisal of the detail includes all internal content in terms of subjective interpretations of the external event such as emotionality and vividness (Johnson et al., 1988). This key finding between emotionality and energetic arousal and hedonic tone shows the potential availability of autobiographical events and their accessibility to the more evaluative knowledge contained in memory. This finding is consistent with the literature (Lau et al., 2004; Segal et al., 1999) suggesting that reactivity of cognitive content in memory is affected by negative mood.

The two central predictors were energetic arousal and hedonic tone, which seem to act as key influences to shifts in autobiographical content, especially in memories with increased emotionality. There was a further significant change score intercorrelation between emotionality and personal importance. Therefore, it would seem that emotional memories are cued by negatively affected mood states, which are likely to increase personal relevance (Alea & Bluck, 2007). This concurs with mood congruent theories on autobiographical recall; memories with high personal importance and those high in emotional significance would be recalled under similar congruent affective states (Conway, 1990; Conway & Bekerian, 1987). Emotional intensity, therefore, could be an important factor in autobiographical recall (McBride, Cappeliez, 2004; Talarico, LaBar & Rubin, 2004).

The implications from this study are that sensory and emotional content in autobiographical memories can be influenced by negative mood state. The link between mood and autobiographical content only existed for symptomatic and vulnerable in the Studies 2 and 3 respectively. This apparent contradiction may be due to the fact that Study 1 focused on the sensory and emotional components and additionally, the likelihood is that the sample in Study 1 contained participants that were symptomatic and vulnerable which became more salient when divided into symptomatic and vulnerable groups, as in Studies 2 and 3. The results indicate that negative mood might have influenced a shift towards emotional aspects of memory. There is some evidence that particular mood components underlie this shift: emotional arousal and hedonic tone. Tentatively, there is some evidence for Bower's (Bower, 1981) associative network theory, in that similar emotional and affective aspects are evoked by similar negative mood state. This could have important theoretical and clinical implications for treatment. The cognitive theory of depression suggests that negative mood states encourage the selection and interpretation of emotional information differently from those in non-negative mood states (Gotlib & Joormann, 2010). Research into negative mood and memory processes could possibly focus on how retrieval is functionally associated with the early stages of

information processing and in what way in might bias memory. If autobiographical memory is influenced by mood state, then techniques at targeting mood change might have a beneficial impact on memories.

It is clear that not all sensory and emotional content in autobiographical memories is similarly influenced by negative mood state. The lack of significant correlation between the four mood dimensions and valence of memory suggests that valence does not significantly correlate with increase in negative mood. This did not support Hypothesis 1.4 – that there would be a difference in valence. This finding was unexpected, as the literature shows an association between valence and memory recall (Bower, 1981; Watkins, Vache, Vernay, Muller & Mathews, 1996). The four mood components did not yield any further statistically significant intercorrelations between any of the remaining aspects: evaluative judgements, personal importance and how recent the event was (Hypotheses 1.1, 1.2 & 1.5). This supports the idea that mood fails to be an explanation in terms of a single unitary connection but rather demonstrates a multifaceted response, with some variables showing moderate correlations and others showing weak or non-significant correlations with mood components. A possible explanation for the smaller yield of significant correlations in this study may be that previous studies have predominately used depressed subjects, who seem more vulnerable to mood stress. The present study has used a non-clinical student population, which could have a rather different response to a sudden negative mood induction (Laney, Campbell, Heuer & Reisberg, 2004; Williams, Watts, MacLeod & Mathews, 1988). The idea that depressive symptomatology could possibly act as a moderating variable was taken up in the following study, which investigated the cognitive content rather than the emotional and sensory components of autobiographical memory.

Study 2 therefore investigated the effects of mood manipulation on the cognitive content of cued autobiographical memories in non-symptomatic and symptomatic groups. The aim was to assess whether the cognitive products following a negative mood induction procedure are sensitive to temporary mood change.

The design enabled assessment of pre-standing symptoms and the possible effects on accessibility of the cognitive products pre and post mood stress. The existence of depressive symptoms was measured by Beck's' Depression Inventory (BDI). There are several explanatory and conceptual models that explain the cognitive reactivity under negative transient mood change. Cognitive reactivity refers to the phenomenon whereby negative mood states reactivate negative cognitive styles (Segal et al., 2006). Theory is that a history of depression establishes an association between cognitive modes and mood (Lau et al., 2004). It follows that current negative mood states, whatever their origins, would act to make these modes more prominent or available (Raes, Dewulf, Van Heeringen & Williams 2009).

An important finding from this study suggests that negative mood, as measured by hedonic tone, may be acting as a significant predictor of autobiographical content in the non-symptomatic group. The key significant changes were in autobiographical appraisals of rumination, expectancy and personal importance, which all showed significant positive correlations with hedonic tone, suggesting a reduction in all three characteristics. This supports Hypotheses 2.1 ii, iv and v that there would be a change in these characteristics. This finding supports the empirical finding from Lyubomirsky et al. (1999), which suggested that non-symptomatic individuals rated their thoughts as significantly more positive, optimistic and less personally related. The results would tentatively suggest that valence of mood (indexed by hedonic tone) is activating autobiographical content in the non-symptomatic group. The results are also consistent with theory of a hierarchical search that culminates in access to specific event memories being more likely in non-symptomatic individuals (Williams et al., 2006b). It may be possible that memory specificity is present in the non-symptomatic, which enables a targeted memory search and results in cognitive reactivity. It is suggested by Williams et al. (2007) that memories which are high in sensory and perceptual detail are being accessed by the non-symptomatic.

In the symptomatic group, the present research found associations between the depressive symptom group and rumination. This supports Hypothesis 2.2 that there would be a difference in the symptomatic versus the non-symptomatic groups. This key finding suggests that negative mood may be evoking an increase in rumination in those with current depressive symptomatology. The present findings concur with previous research looking at groups with current depressive symptomatology (Golden, Dalgleish & Spinks, 2006; Power Duggan, Lee & Murray, 1995). The results demonstrate that autobiographical cognitive content shows reactivity in those self-reporting depressive symptomatology (indexed by a significant change score correlation between energetic arousal and rumination). The results also support findings from the literature that pre-standing depressive symptoms and rumination are correlated in negative mood states (Williams, 1996). There was no association between mood and rumination in the asymptomatic group, indicating that mood and cognitive characteristics are unaffected in participants who do not have current depressive symptomatology.

The implication from this study is that negative mood, as measured by hedonic tone, may be acting as a significant predictor of autobiographical content in the non-symptomatic group. The key significant changes were in autobiographical appraisals of rumination, expectancy and personal importance, which all showed significant positive correlations with hedonic tone, suggesting a reduction in all three characteristics. The presence of stable depressive symptoms seemed to act to increase ruminative content. The evidence in the literature suggests that negative mood state in those showing current depressive symptomatology can have a negative impact on cognitive processes such as rumination (Oei et al., 2005). The resultant change score correlation between hedonic tone and ruminative content was strong. The evidence from this study may indicate that hedonic tone as a mood component is an important aspect in autobiographical recall. There is some evidence for valence (indexed by hedonic tone) activating increased ruminative content rather than arousal (indexed by energetic and tense arousal). Tentatively, this looks to support the Beck et al. (1979) schema theory,

indicating that cognitive aspects are activated by temporary negative mood state in the presence of stable depressive symptoms.

The study also supports the theory that negative mood state might reactivate negative ruminative styles in the symptomatic (Segal et al., 2006). The implication is that pre-existing negative cognitive styles make the individual more vulnerable at a time of increased negative mood, which makes the available negative modes more accessible (Lau et al., 2004 for a review). Theories of mood regulation suggest that the experience of a negative mood state may trigger cognitive styles that may exacerbate or lock the individual into a prolonged negative mood state (Joormann & Siemer 2004; Rusting & DeHart 2000). The implication is that reducing ruminative cognitive styles could have a consequent effect on reducing negative mood state and depressive interlock (Garnefski & Kraaij, 2007; Williams et al., 2007).

The present findings are in line with previous published research (Derry & Kuiper, 1981; Miranda & Persons, 1988), in that cognitive content responded to negative mood state. There is a clear suggestion in the literature that level of trait depressive symptoms as well as acute transient shift in mood could be associated with shifts in cognitive aspects (Miranda & Persons, 1988). It might be that baseline threshold levels and acute negative mood changes have an increased cognitive consequence due to the presence of relatively stable symptoms. There is some support for this in that the symptomatic group responded by an increase in ruminative content, whereas there was no such response in the non-symptomatic group. Studies such as Clark et al. (1999) demonstrate that individuals showing current symptoms report more dysfunctional cognitive content than those not currently showing trait symptoms, but the authors did not exclude the possibility that the finding might be due to participants having a previous history of depression rather than current symptoms to account for the cognitive reactivity. The idea that a history of depression could possibly act as a moderating variable was considered in the

following study, which investigated the cognitive content of autobiographical memory in vulnerable and non-vulnerable groups.

Study 3 investigated the effects of mood on the cognitive content of cued autobiographical memories in non-vulnerable and vulnerable groups. The aim was to assess whether the cognitive products following a negative mood induction procedure are sensitive to temporary mood change. The design enabled assessment of previous depressive episodes and the possible effects on accessibility of the cognitive products pre and post mood stress. Miranda & Persons (1988) suggest that depressive cognitive aspects are potentially inaccessible in those that are vulnerable until activated by negative mood. Beck (1996) argued that cognitive, affective, motivational, behavioural, and physiological symptoms of depression are linked together as a 'mode'. These modes vary in activation, or what Beck (1996) called charge. They are highly charged during depression, but continue to exist after depression remit, with the mode being far less activated and charged. This mood state hypothesis has been advanced by Persons & Miranda (1992) & Segal & Ingram (1994), and suggests that there are individual differences that exist in the availability of modes, but that the accessibility of these structures varies with present mood.

The findings suggest that the vulnerable (those with a previous history of depression) and non-vulnerable (those without a history of depression) have different reactivity of cognitive content following a negative mood induction procedure. This supported Hypothesis 3.2 that there would be a difference between the vulnerable and non-vulnerable. The present study found that rumination was higher in memories for past appraisals in the vulnerable group (Hypothesis 3.1 ii). The results also yielded evidence that the vulnerable but not the non-vulnerable group showed cognitive bias under mood stress, with other people being seen as less important and future events being evaluated as less certain. This supports Hypothesis 3.1 (iii and iv) that there would be a change in these characteristics. It would seem that induced negative mood during retrieval has an impact on cognitive processes which seems to be associated with both

internal persistent structures in the vulnerable and external mood states. It therefore seems likely that the change in cognitive aspects observed post mood induction has resulted from both trait- and state-like phenomena due to the changes being observed in the trait-like vulnerable group and after the state-like negative mood induction (Fresco et al., 2006).

The implications of this study support the idea that cognitive vulnerability exists in those who have a history of depression, and seems to emerge during transitory negative mood states. Evidence from this study may indicate that arousal (indexed by tense arousal) is an important aspect in autobiographical recall in those with a previous history of depression. The resultant change score correlations in the vulnerable for other people being seen as less important and future events being evaluated as less certain were moderate compared to the weaker correlates seen in the non-vulnerable. The study also found a difference in the amount of vulnerable compared to non-vulnerable rumination, especially for past events, with rumination being a dominant mode for the vulnerable.

Tentatively, this looks to support the Beck et al. (1979) schema theory, in that cognitive aspects are activated by temporary negative mood state in the presence of vulnerability. Gemar et al. (2001) suggest that a temporary negative mood state in those with a previous history of depression can reinstate some of the cognitive features observed in depression itself. Similarly, Persons & Miranda (1992) and Segal & Ingram (1994) have suggested that vulnerable individuals are activated by negative mood, which evokes an increase in the accessibility of cognitive modes from previous episodes. The present study and Gemar et al. (2001) study could also be interpreted as support for Bower's (Bower, 1981) associative network theory, in that similar emotional and affective aspects are evoked by similar negative mood state. Thus it is possible that autobiographical memory may have some longer term trait aspects in conjunction with state aspect that is influenced by the arousal component of mood.

The present research supports previous findings which suggest the presence of vulnerable modes that are sensitive to the mood state (Roberts & Gamble, 2001). The so-called cognitive reactivity seems to be more pronounced in the vulnerable and for aspects that have some degree of self-focused content (indexed by rumination), suggesting the need for the presence of a persistent trait such as previous vulnerability and transitory negative mood state. It is not possible in this study to rule out the role of dispositional depressive symptoms present in the vulnerable that may be the consequence of having had a previous episode of depression. The moderate change score correlations between mood and cognitive characteristics in the vulnerable group show a decrease in the importance of other people and expectancy, with increase in tense arousal and also a change in valence of recalled memories with increased hedonic tone. It would seem from this that the arousal aspect of mood is an important component in activating autobiographical content in the vulnerable, while hedonic tone is important in the valence of memory. Due to the findings that vulnerability seems to be an important moderator in recalled memories from this study, and that current symptomatology seems to increase ruminative cognitive characteristics under temporary negative mood, it was thought necessary to examine both vulnerability and current symptomatology in the same study.

Study 4 therefore investigated the effects of mood on the cognitive content of cued autobiographical memories in non-vulnerable and vulnerable and symptomatic and non-symptomatic groups in the same study. Given the results in self-referent aspects (indexed by rumination) in the previous study, the present study introduces a self-focus manipulation task to enhance the personally important cognitive content and its reactivity. These self-focused events within the ‘working self’ may be closer to relevant cognitive vulnerability (Williams et al., 2008). A variety of investigators have elaborated on the exact nature of the cognitive biases, suggesting that a system of self-focused attention gives rise to idiographic patterns of information processing that activate cognitive styles, such as the increased probability of self-blame, pessimism about the future and own inferiority compared to others (Williams et al., 2008). The questions that have not

fully been resolved in the literature are whether autobiographical memory is influenced by mood state or independent, as argued by Williams (1996). Williams (1996) contends that autobiographical memory is a trait attribute of the individual due to a previous history of depression or some aspects of depressive psychopathology. There is consistent evidence of the role of cognitions in depression, but it is unclear whether these are a result of depressogenic trait-like markers or more mood-state-like phenomena or both. These questions were investigated in Studies 4 and 5.

The key finding in Study 4 suggests that vulnerable versus non-vulnerable and symptomatic versus non-symptomatic individuals have different specificity of cognitive content following a mood induction procedure. This supported Hypotheses 4.2 and 4.3 that there would be a difference between the vulnerable versus non-vulnerable and symptomatic versus non-symptomatic. The present findings suggested that differences existed between vulnerable and non-vulnerable which were only observable in primed negative mood state. The results suggested that the vulnerable group showed cognitive bias under mood stress with typicalness showing less perceptual origins and other people being seen as less important, and future events being evaluated as less certain. This supports Hypotheses 4.1 i, iii and iv that there would be a change in these characteristics. Similar differences existed in those with stable depressive symptomatology compared to those who were asymptomatic, which was only observable in primed negative mood state. The evidence from this study supports theory that, in addition to vulnerability or mild stable symptomatic mood, current negative mood is a necessary condition to measure and observe bias cognitive styles. The results suggested that the symptomatic group showed cognitive bias under mood stress, with typicalness showing less perceptual origins and other people being seen as less important, and future events being evaluated as less certain. This supports Hypotheses 4.1 i, iii and iv that there would be a change in these characteristics.

The implications from the study suggest that autobiographical content can be prone to negative mood in participants with current depressive symptomatology (indexed by BDI) and those participants with a previous history of depression. This study looked at overall mood change rather than individual mood components as done in Studies 1 to 3. Investigating the affects of *overall* mood change on memory characteristics between two points in time could add weight to the argument for causality when added to the results of *individual* mood components. The individual mood components have already been examined in Studies 1 to 3. The hypothesis that cognitive aspects are dependent on mood state would gain in strength if it could be shown that there is an overall mean change in cognitive aspects post manipulation. If accepted, there is a stronger argument that cognitive aspects are dependent to some degree on transient mood state. The significant results in typicalness, importance of other people and valence both in vulnerable and symptomatic groups suggested that cognitive aspects are somewhat dependent on both mood state and 'traitness' in terms of a present vulnerability. The vulnerability seems to be either a previous depressive history or current symptomatology.

The results lend some support for the differential activation hypothesis (Teasdale, 1988), in that cognitive content or modes seem to be evoked by temporary mood state. This seems to be activating cognitive content in people who have a present vulnerability factor. The cognitive content hypothesis suggests that negative mood activates negative bias that then propagates negative mood (Moulds, Kandris, Williams, Lang, Yap & Hoffmeister, 2008). The finding from the previous research and present study supports this theory and indicates that the cognitions involved centre around negative evaluation about future events and the importance of other people (Williams et al., 2008).

The research highlighted that self-focused memories might be acting as a potential moderator in cued autobiographical content. The present research has also highlighted that there is a change in autobiographical cognitive content in the vulnerable and symptomatic, but has not distinguished between the effects of

cognitive reactivity versus the effects of generality of memories. Research into autobiographical memory suggests that negative mood can instigate vulnerable individuals to focus on self-related knowledge which is retrieved in a more overgeneral fashion (Just & Alloy, 1997; Roberts et al., 1988). Given that the evidence from this study and Study 2 related to the uncertainty whether the observed cognitive reactivity was due to memory specificity or activation of latent cognitive content, it was thought prudent to examine memory generality within the retrieved autobiographical memories in the vulnerable and symptomatic in the same study. It could be possible that memory generality is present in the vulnerable and symptomatic due to the effects of self-focused rumination, and this would have consequences for targeted memory search and could result in change in cognitive content by virtue of an incomplete memory search rather than the alternative explanation of activation of latent cognitive content. This was consequently investigated in the next study.

Study 5 investigated the relationship between autobiographical memory specificity in negative mood by evoking a transient primed negative mood state, the explanation being that the induction of negative mood could be differentially increasing memory generality in the vulnerable, as suggested by the differential activation hypothesis (Lau et al., 2004). The memory generality explanation would be an alternative explanation to the standard view that cognitive content is a latent trait that becomes primed in a negative mood state. There is consistent evidence of the role of depression biasing cognitive functioning to elicit more overgeneral autobiographical memories, but it is unclear what other factors mediate this phenomenon. Evidence from the literature suggests that memory generality might not be a trait-like marker, which it has hitherto been conceptualised as, but partly dependent on mood state (McBride & Cappeliez, 2004) and therefore can be seen as a mood-state-dependent phenomenon.

The key finding in Study 5 suggests that vulnerable and non-vulnerable individuals have different specificity of memories following a mood induction procedure. This supports Hypothesis 5.3 that there would be a difference

between the vulnerable and non-vulnerable. There was an increase in general category memories in the vulnerable when in negative mood state (Hypothesis 5.2). There was also a decrease in specific category memories in the vulnerable when in negative mood state (Hypothesis 5.1). This suggests that mood is an important factor in memory specificity, and that changes in specificity occurred under mood stress differentially in the vulnerable group but not the non-vulnerable. Also, in the vulnerable, the present research found associations between history of depression and overgeneral memories. This latter finding supports previous research observing previous vulnerability (Svaldi & Mackinger, 2003 & 2004) and its effect on memory generality when under mood stress. The second key finding suggests that symptomatic and non-symptomatic individuals are similarly influenced following a mood induction procedure. This did not support the hypothesis that there would be a difference between the symptomatic and non-symptomatic. The present findings suggest that transient mood state affects overgeneral memories in both symptomatic and non-symptomatic groups. The findings suggest that it is transient mood state and previous history, but not the presence of current symptoms *per se,* which seem to account for changes in memory generality in autobiographical recall.

The implications from this study suggest that autobiographical memory specificity can be manipulated by negative mood state in participants with a reported history of depression but not in those without reported history. Secondly, the results suggest that autobiographical memory specificity can be manipulated in participants with depressive symptomatology and in participants without current symptoms. The findings suggest that reduced autobiographical memory specificity can be a function of current mood state, and could be independent of levels of depressive symptomatology.

Taken together, the results support the possibility that autobiographical memory, specifically overgeneral memory style, might be influenced by temporary mood state. This finding does challenge the position that overgeneral memory is only contingent on long-term vulnerability (Williams, 1996). This research suggests

that mood state results in overgeneral memory and that previous vulnerability seems to be an important factor in the process. Theory that explains overgeneral memory style (Conway & Pleydell-Pearce, 2000) indicates that individuals possibly start with a generic memory search of life events. It is possible that such a search evokes aversive memories or negative associations and results in the search being aborted at the categoric stage. The resultant search is described as a 'truncated search strategy' (Williams et al., 2007). It is hypothesised that because categoric memories are searched over and over again, they become over-rehearsed and more readily available next time. It has also been hypothesised that this iterative process encourages negative cognitive biases and self-reference (McIiwain, Taylor & Greeves, 2010). This clearly links overgeneral memory style with cognitive processes.

The present research has highlighted that cognitive content (e.g. decreased ability to evaluate future events and increase in self-focused worries about the self) and overgeneral memory (e.g. increase in general memories and decrease in specific memories) are affected by temporary induced negative mood state. Overgeneral memory and cognitive content would seem to be two facets of mood state effects on autobiographical recall which might interact or be separate phenomena. It would seem that negative mood serves to activate the depressive content with the increased endorsement of certain cognitive characteristics. Some cognitive processes dominate during the presence of depressive symptoms, such as increased access to negative automatic thoughts or cognitive biases, and others, such as increases in overgeneral memory style, seem to endure when non-symptomatic but persist in those with a history of depression. The suggestion is that mood state effect on autobiographical content and memory is multifaceted, with some facets being mood-state-dependent and other facets being a stable function of vulnerability to depression.

7.2 Collective findings and interpretations

The present research involves several studies focused on the effects of negative mood on autobiographical content and memory generality. Mood has been seen

to influence cognitive reactivity and memory generality. The present research has found that cognitive reactivity, specifically content about the importance of other people and expectancies about the future, seems to respond to negative mood in the vulnerable and symptomatic. Secondly, memory generality – how individuals recall their past in an overgeneral way – tends to recall a number of events without retrieving specific event memories. These two facets of mood on autobiographical recall might interact or be separate phenomena in influencing state autobiographical retrieval within the individual. It can be seen that overgeneral recall might prevent previous information from past memories being accessed or make helpful cognitive content unavailable to generate additional helpful cognitive content.

So, what can be interpreted from the key findings from each study and the collective findings from all five studies in this research? Study 1 suggested that the affective and emotional aspects of autobiographical memory were altered by negative mood, specifically that there was greater evidence for the emotional aspects being altered by energetic arousal and hedonic tone. Study 2 indicates that hedonic tone was acting as a significant predictor of autobiographical content in the non-symptomatic group. The key significant changes were in autobiographical appraisals of rumination, expectancy and personal importance. It also suggests that the cognitive aspect, specifically rumination, was sensitive to temporary mood change and that this was seen in the symptomatic group. The suggestion is that current symptoms might be acting as a moderating factor. In Study 3, the vulnerable group compared to the non-vulnerable group showed cognitive shift under negative mood state, with other people being seen as less important and future events being evaluated as less certain. The study also found that rumination was higher in memories for past appraisals and indicated that vulnerability might also be acting as a moderating factor. Studies 2 & 3 collectively suggest that differences in cognitive characteristics in autobiographical content are seen most clearly when activated by negative mood in the presence of vulnerability or in those displaying current symptomatology. It would tentatively seem that valence of mood (indexed by hedonic tone) is

activating autobiographical content in the non-symptomatic. The arousal component of mood (indexed by tense arousal) would seem to be more important in activating autobiographical content in those with a history of depression.

Tentatively, Studies 1 to 3 provide evidence that autobiographical recall has state aspects that are triggered by low arousal (indexed by energetic and tense arousal). Study 3 suggests that those with a previous depressive history would seem to be more reactive to a tense arousal component and those with depressive symptomatology would seem to be more reactive to a hedonic tone component, which seems to increases ruminative content in those with current depressive symptomatology. Other aspects of hedonic tone – i.e. valence attribute of mood – seem to affect the non-symptomatic in a beneficial fashion by a reduction in rumination and other key cognitive attributes such as expectancy and personal importance. This is speculative but invites future research into the key component of mood found in this research.

Study 4 investigated the effects of mood on the self-focused cognitive content of cued autobiographical memories in vulnerable and symptomatic groups in the same study. The results suggested that the vulnerable and symptomatic groups showed similar cognitive characteristics change under mood stress, with typicalness showing less perceptual origins, other people being seen as less important, and future events being evaluated as less certain. Study 5 investigated the relationship between autobiographical memory generality in primed negative mood state. The autobiographical memory model proposed by Conway & Pleydell-Pearce (2000) suggests that overgeneral memory may be due to the memory search being abandon early in the retrieval stage. The finding from this study support Conway & Pleydell-Pearce's (2000) hierarchical model that the negative mood state maybe cueing memories that are higher up the memory search than the event specific memories. The findings indicated that transient mood state influences overgeneral memories in both symptomatic and vulnerable groups. The present research has highlighted that overgeneral memories might

be acting as a potential moderator in cued autobiographical content. Studies 4 & 5 collectively suggest that overgeneral memory might interact with negative mood state in a similar way that negative mood state acts on cognitive characteristics in the vulnerable and symptomatic. The collective findings might indicate that negative mood state influences recall of autobiographical memories by changes in cognitive reactivity and overgenerality of memories.

Therefore, Studies 4 and 5 provide tentative evidence that autobiographical memory has state aspects that are triggered by negative mood shift in those with a previous depressive episode. The findings present a challenge to the claim that autobiographical memory generality is independent of mood state (Williams, 1996). Secondly, they suggest that current symptomatology is less important in triggering overgeneral memory style in low mood states than in triggering cognitive aspect. This is speculative, but again invites future research into the key mediating factors in producing state changes found in this research.

In relation to all the evidence available from the studies in this research, experimentally inducing negative mood state leads to a shift in autobiographical content and overgeneral memory style when a history of depression or current symptomatology are present. Thus, overgeneral memory and autobiographical content seem have some state reactivity in the presence of more trait-like characteristics, and seem to be closely related in their outcome in response to a negatively primed mood state.

7.3 Study limitations

This study was unique in its efforts to identify the mood state effects in the recall of autobiographical content and memory. Previous research has induced negative mood, but none has made efforts to account for symptomatology and vulnerability in the same study. While the research has strengths, there were some limitations that must be acknowledged in light of the present findings. As the first three studies largely deal with change score correlation, no causal relationship between mood and autobiographical characteristic can be

suggested. However, the change score intercorrelations added clarity to the current literature when many questions about the nature of the relationship between negative mood and autobiographical memory remain uncertain.

There is also a second possibility that the sample size was inadequate to detect a real effect. The sample size was determined based on a power analysis to detect a moderate effect size. The percentages of symptomatic and vulnerable compared to non-vulnerable and non-symptomatic were small due to the exclusion criteria based on BDI scores. The restrictive range on the BDI meant that depressive symptomatology was minimal and subclinical. The BDI is well established at detecting depressive symptomatology and clinical caseness (Kim & Park, 2010). Only when higher scoring participants are included can further inferences about the nature of depression and state effects be made. Subsequently, analyses which used this restricted subset of participants suffered from reduced power to detect significant effects. However, future research should aim to recruit a larger number of participants with higher BDI scores and a match sample of those with a history of depression to strengthen the sample sizes.

Studies reported in this thesis rely on multiple correlations without correction for multiple comparisons. Several tests exist for corrections for multiple comparisons or type I errors such as Bonferroni, Scheffe and Sidak methods. However, these tend to be far too conservative with large correlation matrices and result in an increase in type II errors (Saville, 1990). The researcher reported the size of the correlation matrix, number of correlations and corresponding p values, and was transparent about leaving them uncorrected as recommended by Saville (1990). It suggests that corrections for multiple comparisons should not be performed, but simply report all data and let the readers make their conclusions (Saville, 1990). It is recognised that this approach could increase the probability of type I errors, yielding association where no true association exists, but conducting a correction would have resulted in significant loss of power. Nevertheless the resultant interpretations have necessarily been reported with this consideration.

There was also an assumption made in the research of continuity between non-clinical depressive mood and clinical depression. The concept of depression includes a continuum of symptoms ranging from dysphoria, which most people experience, to clinical depression that requires treatment (Paykel & Priest, 1992). It has to be acknowledged that there could be features of depression that are discontinuous, which might have differential impacts on information processing (Flett et al., 1997), and therefore inferences from studies related to clinical depression might bear little or no relationship to present findings. However, past researchers have used the continuity model of depression to related studies using a continuity model of symptoms.

The population from which the sample was selected may limit the generalizability of the present findings. All participants were university students selected from a restricted cap on depressive symptoms. The sample was comprised mainly of female gender, which again might contain some gender effects such as increases in vulnerability and symptomatology due to increased prevalence rates recorded among the population (WHO, 2011).

7.4 Suggestions for Further Research

Finally, some possible limitations of the present research need some elaboration, and at the same time suggestions for future research will be discussed. While the current research yielded valuable evidence regarding mood state effects and potential moderators in the relationship between negative mood components and autobiographical recall, some restrictions to conclusions deserve to be addressed. The issues of fidelity regarding mood induction, demand characteristics and issues around cueing and measuring autobiographical memories have been elaborated on in the first chapter, so only those that have not been addressed so far will be discussed.

The dividing of the sample into those who were vulnerable and those who showed current depressive symptoms reduced the overall sample size and power to interpret significant results. Also, relatively large number of outcome

variables and exploratory nature required several correlational analyses and t-tests. This could have increased the probability of Type I errors, yielding association where no true association exists. The relatively small samples in the vulnerable and symptomatic groups could also have increased the chance of Type II errors, yielding no association where one existed. Larger sample sizes of symptomatic and vulnerable participants with higher levels of dysphoric symptoms would increase power to detect significant effects.

Future studies might want to consider assessing the effects of negative mood state in the presence of a vulnerability to depression and current symptomatology. Several studies have found a history of depression to be a significant factor in autobiographical reactivity and memory generality (Gemar et al., 2001; Scher et al., 2005; Raes et al., 2007; Yeung et al., 2006 respectively). Clinical population could be studied to see if there could be features of depression that are discontinuous, which might have differential impacts on autobiographical content or memory rather than rely on the continuity principle between dysphoric and depressive symptoms. Furthermore, investigating a clinically depressed population and comparing it to a non-clinical population could enable separation and clarification of the effects of transitory mood states and stable mood states on cognitive reactivity and memory generality.

The generalizability of this study might be increased by utilising a more diverse population and including a greater match in men as well as women. The present research was skewed for gender, with female students dominating each study. This is an important issue given the recent research finding which indicates gender difference in autobiographical retrieval (Piefke, Weiss, Markowitsch & Fink, 2005; Pillemer, Wink, DiDonato & Sanborn, 2003). These studies suggest that the present finding cannot readily be applied to skewed male populations or other populations with more diverse gender mix and socio-economic factors. Future research should seek to address gender differences by examining female and male genders both separately and combined from a diverse socio-economic population.

Despite the limitations of the current research, the question of how negative mood affects autobiographical content and memory remains a timely and useful question, especially in light of the recent interest in targeting autobiographical aspects such as ruminative content and overgeneral memory styles. Ultimately, increasing understanding of the degree to which types of negative mood states affect autobiographical content and memory may allow for more effective and efficient treatment interventions.

The present findings confirm that mood state response is not unitary, but multidimensional in nature. Negative mood state seems to elicit increased cognitive reactivity in the vulnerable and an increase in disruptive reactivity i.e. rumination in those with current depressive symptomatology. It would seem that cognitive reactivity is not merely vulnerability- or symptom-related, but is mood-state-dependent on negative mood in the presence of either of these vulnerabilities, both operating as independent provoking factors. Similarly, overgeneral memory is not merely vulnerability-related but is mood-state-dependent on negative mood in the presence of a previous history of depression. In contrast, current depressive symptomatology is less important in triggering overgeneral memory style in low mood states and seems to appear whether or not depressive symptoms are present, but seems to be related to negative mood state. The research highlights the importance of assessing the autobiographical response to negative mood state and identifying cognitive styles. The focus on prevention and coping strategies that directly target mood state effects on autobiographical recall would likely reap benefits to those with a vulnerability or depressive symptomatology.

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Appendix 1
Consent form

Title of Project:

Name of Researcher:

Please initial box

1. I confirm that I have read and understand the information sheet dated …….for the above study and have had the opportunity to ask questions. ☐
2. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason or legal rights being affected. ☐
3. I agree to take part in the above study. ☐

_____	_____	_____
Name of Participant	Date	Signature
_____	_____	_____
Name of person taking consent (if different from researcher)	Date	Signature
_____	_____	_____
Researcher	Date	Signature

(*1 for participant; 1 for researcher*)

Appendix 2
Participant Information Sheet

Instructions
You are about to take part in an experiment that will involve filling out several questionnaires on mood. You will then be asked to read a series of statements to yourself that will be presented on a screen, and for some participants the procedure may lead to a mood change. This will be followed by several short questionnaires to finish the experiment and a second series of statements.

The first questionnaire will assess depressive symptoms and mood. Some questions you will answer are about signs of depression. If your answers show you may be helped by an evaluation for depression, we will let you know and suggest that you talk with your health care provider about an evaluation. There will be somebody available to discuss any questions that you have after leaving the lecture room. If you have any questions at all, then please ask.

In the actual experimental procedure participants will be asked to complete a series of mood measures before reading a series of statements. The procedure will be conducted under experimental conditions so there will be no talking whilst filling out the questionnaire or when reading the series of statements. If you have questions, please raise your hand and I will come and speak to you. Please could you be silent so that others can concentrate on the tasks provided and so that you don't unduly influence the other volunteers.

Your participation is entirely voluntary and you can withdraw at any stage of the experiment and no penalties or loss will incurred by non-participation.

Confidentiality will be assured by using a random 6-digit number that will be given to you by the researcher.

Debriefing will take place once the experimental procedure has been completed. Once the experiment has finished the researcher will hand out contact details for support and advice.

Please sign the consent slip below and detach from this form.

I consent to the above procedure and I understand that my participation is strictly voluntary and I can withdraw from the experiment at any stage without question. I am happy with the information provided.

Full name:

Signature:

Appendix 3
Research Approval forms

Study 1

IMPORTANT. PLEASE NOTE:

(1) You should check with your supervisor before carrying out each part of your research; (2) All applications must be assessed by 2 reviewers and discussed by departmental ethics committee before approval can be granted. (3) Any change of plans after approval is given must be discussed with your supervisor; (4) Supervisors can approve minor changes on behalf of the Ethics Committee, but a further application to the Ethics Committee will be necessary for non-minor changes; (5) You must append additional information as necessary (e.g., informed consent form, copies of questionnaires or other measures to be used, experimental protocols, interview schedules, etc.). If you do not give sufficient information for the Committee to make a decision, your application will be delayed pending further information; (6) If you require a CRB check, your supervisor must sign that they have seen the clearance. Failure to include a signature will involve an unnecessary delay; (7) If you require a risk assessment form, you must obtain the appropriate signatures. Failure to include appropriate signatures will involve an unnecessary delay; (8) You must submit this form TYPED. Failure to do so will result in form rejection and unnecessary delay.

I confirm that I have read: (1) the current version of *Ethical Principles in Psychological Research with Human Participants* produced by the British Psychological Society; (2) the *Code of Practice Concerning Ethical Principles for Research* produced by University of Chester. (Both documents are available in the Psychology Department.)

Signed:  (Applicant) Date: 15-10-04

****

Supervisor's comments: (this will normally be the lead supervisor)

Have you discussed ethical issues with the applicant? Please comment on how the applicant intends to deal with ethical issues arising: (If this is a re-submission please comment on how the student has dealt with resubmission conditions.)

- **ACCEPTABLE** ☑
- **ACCEPTABLE SUBJECT TO CONDITIONS LISTED. RESUBMIT WITH SUPERVISOR COMMENTS AND SIGNATURE** ☐
- **REVISE AND RESUBMIT. SEEK SUPERVISOR ADVICE** ☐

Appendix 3 Continued
Research Approval forms

Study 2

IMPORTANT. PLEASE NOTE:
(1) You should check with your supervisor before carrying out each part of your research; (2) All applications must be assessed by 2 reviewers and discussed by departmental ethics committee before approval can be granted. (3) Any change of plans after approval is given must be discussed with your supervisor; (4) Supervisors can approve minor changes on behalf of the Ethics Committee, but a further application to the Ethics Committee will be necessary for non-minor changes; (5) You must append additional information as necessary (e.g., informed consent form, copies of questionnaires or other measures to be used, experimental protocols, interview schedules, etc.). If you do not give sufficient information for the Committee to make a decision, your application will be delayed pending further information; (6) If you require a CRB check, your supervisor must sign that they have seen the clearance. Failure to include a signature will involve an unnecessary delay; (7) If you require a risk assessment form, you must obtain the appropriate signatures. Failure to include appropriate signatures will involve an unnecessary delay; (8) You must submit this form TYPED. Failure to do so will result in form rejection and unnecessary delay.

I confirm that I have read: (1) the current version of *Ethical Principles in Psychological Research with Human Participants* produced by the British Psychological Society; (2) the *Code of Practice Concerning Ethical Principles for Research* produced by University of Chester. (Both documents are available in the Psychology Department.)

Signed:  (Applicant) Date: 15-03-05

****

Supervisor's comments: (this will normally be the lead supervisor)
Have you discussed ethical issues with the applicant? Please comment on how the applicant intends to deal with ethical issues arising: (If this is a re-submission please comment on how the student has dealt with resubmission conditions.)

- **ACCEPTABLE** ☑
- **ACCEPTABLE SUBJECT TO CONDITIONS LISTED. RESUBMIT WITH SUPERVISOR COMMENTS AND SIGNATURE** ☐
- **REVISE AND RESUBMIT. SEEK SUPERVISOR ADVICE** ☐

Appendix 3 Continued
Research Approval forms

Study 3

IMPORTANT. PLEASE NOTE:
(1) You should check with your supervisor before carrying out each part of your research; (2) All applications must be assessed by 2 reviewers and discussed by departmental ethics committee before approval can be granted. (3) Any change of plans after approval is given must be discussed with your supervisor; (4) Supervisors can approve minor changes on behalf of the Ethics Committee, but a further application to the Ethics Committee will be necessary for non-minor changes; (5) You must append additional information as necessary (e.g., informed consent form, copies of questionnaires or other measures to be used, experimental protocols, interview schedules, etc.). If you do not give sufficient information for the Committee to make a decision, your application will be delayed pending further information; (6) If you require a CRB check, your supervisor must sign that they have seen the clearance. Failure to include a signature will involve an unnecessary delay: (7) If you require a risk assessment form, you must obtain the appropriate signatures. Failure to include appropriate signatures will involve an unnecessary delay; (8) You must submit this form TYPED. Failure to do so will result in form rejection and unnecessary delay.

I confirm that I have read: (1) the current version of *Ethical Principles in Psychological Research with Human Participants* produced by the British Psychological Society; (2) the *Code of Practice Concerning Ethical Principles for Research* produced by University of Chester. (Both documents are available in the Psychology Department.)

Signed:  (Applicant) Date: 28-04-06

****

Supervisor's comments: (this will normally be the lead supervisor)
Have you discussed ethical issues with the applicant? Please comment on how the applicant intends to deal with ethical issues arising: (If this is a re-submission please comment on how the student has dealt with resubmission conditions.)

- **ACCEPTABLE** ☑
- **ACCEPTABLE SUBJECT TO CONDITIONS LISTED. RESUBMIT WITH SUPERVISOR COMMENTS AND SIGNATURE** ☐
- **REVISE AND RESUBMIT. SEEK SUPERVISOR ADVICE** ☐

Appendix 3 Continued
Research Approval forms

Studies 4 & 5

IMPORTANT. PLEASE NOTE:
(1) You should check with your supervisor before carrying out each part of your research; (2) All applications must be assessed by 2 reviewers and discussed by departmental ethics committee before approval can be granted. (3) Any change of plans after approval is given must be discussed with your supervisor; (4) Supervisors can approve minor changes on behalf of the Ethics Committee, but a further application to the Ethics Committee will be necessary for non-minor changes; (5) You must append additional information as necessary (e.g., informed consent form, copies of questionnaires or other measures to be used, experimental protocols, interview schedules, etc.). If you do not give sufficient information for the Committee to make a decision, your application will be delayed pending further information; (6) If you require a CRB check, your supervisor must sign that they have seen the clearance. Failure to include a signature will involve an unnecessary delay: (7) If you require a risk assessment form, you must obtain the appropriate signatures. Failure to include appropriate signatures will involve an unnecessary delay; (8) You must submit this form TYPED. Failure to do so will result in form rejection and unnecessary delay.

I confirm that I have read: (1) the current version of *Ethical Principles in Psychological Research with Human Participants* produced by the British Psychological Society; (2) the *Code of Practice Concerning Ethical Principles for Research* produced by University of Chester. (Both documents are available in the Psychology Department.)

Signed:  (Applicant) Date: 11-03-09

****

Supervisor's comments: (this will normally be the lead supervisor)
Have you discussed ethical issues with the applicant? Please comment on how the applicant intends to deal with ethical issues arising: (If this is a re-submission please comment on how the student has dealt with resubmission conditions.)

- **ACCEPTABLE** ☑
- **ACCEPTABLE SUBJECT TO CONDITIONS LISTED. RESUBMIT WITH SUPERVISOR COMMENTS AND SIGNATURE** ☐
- **REVISE AND RESUBMIT. SEEK SUPERVISOR ADVICE** ☐

Appendix 4
Beck Depression Inventory (BDI-II)

Date…….

Name……..
Cohort…….

This questionnaire consists of 21 groups of statements. Please read each group of statements carefully, and then pick out the one statement in each group that best describes the way you have been feeling during the past two weeks, including today. Circle the number beside the statement you have picked. If several statements in the group seem to apply equally well, circle the highest number for that group. Be sure that you do not choose more than one statement for any group.

1. Sadness
0. I do not feel sad.
1 I feel sad much of the time.
2 I am sad all of the time.
3 I am so sad or unhappy that I can't stand it.

2. Pessimism
0. I am not discouraged about my future.
1 I feel more discouraged about my future than I used to be.
2 I do not expect things to work out for me.
3 I feel my future is hopeless and will only get worse.

3. Past Failure
0 I do not feel like a failure.
1 I have failed more than I should have.
2 As I look back, I see a lot of failures.
3 I feel I am a total failure as a person.

4. Loss of Pleasure
0 I get as much pleasure as I ever did from the things I enjoy.
1 I do not enjoy things as much as I used to.
2 I get very little pleasure from the things I used to enjoy.
3 I cannot get any pleasure from the things I used to enjoy.

5. Guilty Feelings
0 I do not feel particularly guilty.
1 I feel guilty over many things I have done or should have done.
2 I feel quite guilty most of the time.
3 I feel guilty all of the time.

Appendix 4 Continued
Beck Depression Inventory (BDI-II)

6. Punishment Feelings
0 I do not feel I am being punished.
1 I feel I may be punished.
2 I expect to be punished.
3 I feel I am being punished.

7. Self-Dislike
0. I feel the same about myself as ever.
1 I have lost confidence in myself.
2 I am disappointed in myself.
3 I dislike myself.

8. Self-Criticalness
0 I don't criticise or blame myself more than usual.
1 I am more critical of myself than I used to be.
2 I criticise myself for all my faults.
3 I blame myself for everything bad that happens.

9. Suicidal Thoughts and Wishes
0. I do not have any thoughts of killing myself.
1 I have thoughts of killing myself but would not carry them out.
2 I would like to kill myself.
3 I would kill myself if I had the chance.

10. Crying
0 I do not cry any more than I used to.
1 I cry more than I used to.
2 I cry over every little thing.
3 I feel like crying but I can't.

11. Agitation
0 I am no more restless or wound up than usual.
1 I feel more restless and wound up than usual.
2 I am so restless or agitated that it is hard to stay still.
3 I am so restless or agitated that I have to keep moving or doing something.

12. Loss of Interest
0 I have not lost interest in other people or activities.
1 I am less interested in other people or things than before.
2 I have lost most of my interest in other people or things.
3 It is hard to get interested in anything.

Appendix 4 Continued
Beck Depression Inventory (BDI-II)

13. Indecisiveness
0 I make decisions about as well as ever.
1 I find it more difficult to make decisions than usual.
2 I have much greater difficulty in making decisions than I used to.
3 I have trouble making any decisions.

14. Worthlessness
0 I do not feel that I am worthless.
1 I do not consider myself as worthwhile and useful as I used to.
2 I feel more worthless as compared to other people.
3 I feel utterly worthless.

15. Loss of Energy
0 I have as much energy as ever.
1 I have less energy than I used to have.
2 I do not have enough energy to do very much.
3 I do not have enough energy to do anything.

16. Changes in Sleeping Pattern
0 I have not experienced any change in my sleeping pattern.
1 I sleep somewhat more/less than usual.
2 I sleep a lot more/less than usual.
3 I sleep most of the day/I wake up 1-2 hours early and cannot get back to sleep.

17. Irritability
0 I am no more irritable than usual.
1 I am more irritable than usual.
2 I am much more irritable than usual.
3 I am irritable all the time.

18. Changes in Appetite
0 I have not experienced any changes in my appetite.
1 My appetite is somewhat less/greater than usual.
2 My appetite is much less/greater than usual.
3 I have no appetite/crave food all the time.

19. Concentration Difficulty
0 I can concentrate as well as ever.
1 I can't concentrate as well as usual.
2 It's hard to keep my mind on anything for very long.
3 I find I can't concentrate on anything.

Appendix 4 Continued
Beck Depression Inventory (BDI-II)

20. Tiredness or Fatigue
0 I am no more tired or fatigued than usual.
1 I get more tired or fatigued more easily than usual.
2 I am too tired or fatigued to do a lot of the things I used to do.
3 I am too tired or fatigued to do most of the things I used to do.

21. Loss of interest in Sex
0 I have not noticed any recent changes in my interest in sex.
1 I am less interested in sex than I used to be.
2 I am much less interested in sex now.
3 I have lost interest in sex completely.

Appendix 5
UWIST Mood Adjective Checklist

Instructions

This questionnaire is concerned with your current feelings. Please answer **every** question, even if you find it difficult. Answer, as honestly as you can, what is true of **you**. Please do not choose a reply just because it seems like the 'right thing to say'. Your answers will be kept entirely confidential. Also, be sure to answer according to how you feel **AT THE MOMENT**. Don't just put down how you usually feel. You should try and work quite quickly: there is no need to think very hard about the answers. The first answer you think of is usually the best.

Before you start, please provide some general information about yourself.

Age ..... (years) Sex M F (Circle one)

Date ..... Participant No.

Here is a list of words which describe people's moods or feelings. Please indicate how well each word describes how you feel **AT THE MOMENT**. For each word, circle the answer from 1 to 4 which best describes your mood.

	Definitely	Slightly	Slightly Not	Definitely Not
1. Happy	1	2	3	4
2. Dissatisfied	1	2	3	4
3. Energetic	1	2	3	4
4. Relaxed	1	2	3	4
5. Alert	1	2	3	4
6. Nervous	1	2	3	4
7. Passive	1	2	3	4
8. Cheerful	1	2	3	4
9. Tense	1	2	3	4
10. Jittery	1	2	3	4
11. Sluggish	1	2	3	4
12. Sorry	1	2	3	4
13. Composed	1	2	3	4
14. Depressed	1	2	3	4
15. Restful	1	2	3	4
16. Vigorous	1	2	3	4
17. Anxious	1	2	3	4
18. Satisfied	1	2	3	4
19. Unenterprising	1	2	3	4
20. Sad	1	2	3	4
21. Calm	1	2	3	4
22. Active	1	2	3	4
23. Contented	1	2	3	4
24. Tired	1	2	3	4
25. Impatient	1	2	3	4
26. Annoyed	1	2	3	4
27. Angry	1	2	3	4
28. Irritated	1	2	3	4
29. Grouchy	1	2	3	4

Appendix 6
Cued Autobiographical recall instructions

Participants were asked to rate each memory triggered by the neutral cue word on a 7-point Likert scale.

Study 1

How clearly can you remember the event?
Approximately how long ago did the event happen (in years)?
How personally important was this event?
How emotional was the event?
How positive or negative was this emotionality (- or +)?

Study 2

How typical is the event in your life?
How often do you think about the event?
How did you feel about the event at the time?
How important were other people in the event?
Was the event expected?
How desirable was the event?
How important was the event for you?
Approximately how long ago was the event?

Study 3

Statement answered for ‘present’ and ‘past’ memories.

How typical is the event in your life?
How often do you think about the event?
How did you feel about the event?
How important were other people in the event?
How would you rate the expectancy of the event?
How would you rate the desirability of the event?
How important was the event for you?
Approximately how long ago was the event?

Appendix 6 Continued
Cued Autobiographical recall instructions

Participants were asked to rate each memory triggered by the neutral cue word on a 7 point Likert scale.

Study 4

How typical is the event in your life?
How often do you think about the event?
How did you feel about the event at the time?
How important were other people in the event?
How would you rate the expectancy of the event?
How would you rate the desirability of the event?
How important was the event for you?
Approximately how long ago was the event?

Appendix 7a
Instructions for Velten Mood Induction procedure

Instructions: Negative Mood Induction statements
Read each of the following statements to yourself. As you look at each statement, focus your observation only on that one.

1. Today is neither better nor worse than any other day.
2. However, I feel a little low today.
3. I feel rather sluggish now.
4. Sometimes I wonder if university is all that worthwhile.
5. Every now and then I feel so tired and gloomy that I'd rather just sit than do anything.
6. I can remember times when everybody but me seemed full of energy.
7. Too often I have found myself staring listlessly into the distance, my mind a blank, when I definitely should have been studying.
8. It has occurred to me more than once that study is basically useless, because you forget almost everything you learn anyway.
9. People annoy me; I wish I could be by myself.
10. I've had important decisions to make in the past, and I've sometimes made the wrong ones.
11. I do feel somewhat discouraged and drowsy – maybe I'll need a nap when I get home.
12. Perhaps College takes more time, effort, and money than it's worth.
13. I'm afraid the war in the Middle East may get a lot worse.
14. I just don't seem to be able to get going as fast as I used to.
15. There have been days when I felt weak and confused, and everything went miserably wrong.
16. Just a little bit of effort tires me out.
17. I've had daydreams in which my mistakes kept occurring to me – sometimes I wish I could start all over again.
18. I'm ashamed that I've caused my parents needless worry.
19. I feel terribly tired and indifferent to things today.
20. Just to stand up would take a big effort.
21. I'm getting tired out. I can feel my body getting exhausted and heavy.
22. I'm beginning to feel sleepy. My thought are drifting.
23. At times I've been so tired and discouraged that I went to sleep rather than face important problems.
24. My life is so tiresome – the same old things day after day depresses me.
25. I couldn't remember things well right now if I had to.
26. I just can't make up my mind; it's so hard to make simple decisions.
27. I want to go to sleep – I feel like just closing my eyes and going to sleep right here.
28. I'm not very alert; I feel listless and vaguely sad.
29. I've doubted that I'm a worthwhile person.
30. I feel worn out. My health may not be as good as it's supposed to be.

Appendix 7a Continued
Instructions for Velten Mood Induction procedure

31. It often seems that no matter how hard I try, things still go wrong.
32. I've noticed that no one seems to really understand or care when I complain or feel unhappy.
33. I'm uncertain about my future.
34. I'm discouraged and unhappy about myself.
35. I've lain awake at night worrying so long that I hated myself.
36. Things are worse now than when I was younger.
37. The way I feel now, the future looks boring and hopeless.
38. My parents never really tried to understand me.
39. Some very important decisions are almost impossible for me to make.
40. I feel tired and depressed; I don't feel like working on the things I know I must get done.
41. I feel horribly guilty about how I've treated my parents at times.
42. I have the feeling that I just can't reach people.
43. Things are easier and better for other people than for me; I feel like there is no use in trying again.
44. Other people make me very upset: I don't like to be around them.
45. It takes too much effort to convince people of anything. There's no point in trying.
46. I fail in communicating with people about my problems.
47. It's so discouraging the way people don't really listen to me.
48. I've felt so alone in the past that I could have cried.
49. Sometimes I've wished I could die.
50. My thoughts are so slow and downcast. I don't want to think or talk.
51. I've don't care about anything. Life just isn't any fun.
52. Life seems too much for me anyhow – my efforts are wasted.
53. I'm so tired.
54. I don't concentrate or move. I just want to forget about everything.
55. I have too many bad things in my life.
56. Everything seems utterly futile and empty.
57. I feel dizzy and faint. I need to put my head down and not move.
58. I don't want to do anything.
59. All of the unhappiness of my past life is taking possession of me.
60. I want to go to sleep and never wake up.

Appendix 7b
Instructions for Velten Mood Induction procedure

Positive Mood Induction statements

Instructions

Read each of the following statements to yourself. As you look at each statement, focus your observation only on that one.

1. Today is neither better nor worse than any other day.
2. I do feel pretty good today, though.
3. I feel light-hearted.
4. This might turn out to have been one of my good days.
5. If your attitude is good, then things are good, and my attitude is good.
6. I've certainly got energy and self-confidence to spare.
7. I feel cheerful and lively.
8. On the whole, I have very little difficulty in thinking clearly.
9. My parents are pretty proud of me most of the time.
10. I'm glad I'm in College – it's the key to success nowadays.
11. For the rest of the day, I bet things will go really well.
12. I'm pleased that most people are so friendly to me.
13. My judgement about most things is sound.
14. It's encouraging that, as I get further into my studies, it's going to take less study to get good grades.
15. I'm full of energy and ambition. I feel like I could go a long time without sleep.
16. This is one of those days when I can grind out academic work with practically no effort at all.
17. My judgement is keen and precise today. Just let someone try to put something over on me.
18. When I want to, I can make friends extremely easily.
19. If I set my mind to it, I can make things turn out fine.
20. I feel enthusiastic and confident now.
21. There should be opportunity for a lot of good times coming along.
22. My favorite song keeps going through my head.
23. Some of my friends are so lively and optimistic.
24. I feel talkative … I feel like talking to almost anybody.
25. I'm full of energy, and am really getting to like the things I'm doing on campus.
26. I'm able to do things accurately and efficiently.
27. I know good and well that I can achieve the goals I set.
28. Now that it occurs to me, most of the things that have depressed me wouldn't have if I'd just had the right attitude.
29. I have a sense of power and vigor.
30. I feel so vivacious and efficient today … sitting on top of the world.

Appendix 7b Continued
Instructions for Velten Mood Induction procedure

31. It would really take something to stop me now!
32. In the long run, it's obvious that things have become better and better during my life.
33. I know that in the future I won't over-emphasise so-called 'problems'.
34. I'm optimistic that I can get along very well with most of the people I meet.
35. I'm too absorbed in things to have time for worry.
36. I'm feeling amazingly good today!
37. I am particularly inventive and resourceful in this mood.
38. I feel superb! I think I can work to the best of my ability.
39. Things look good. Things look great!
40. I feel that many of my friendships will stick with me in the future.
41. I can find the good in almost anything.
42. I feel so happy and playful today. I feel like surprising someone by telling a silly joke.
43. I feel an exhilarating animation in all I do.
44. I feel highly perceptive and refreshed.
45. My memory is in rare form today.
46. In a buoyant mood like this one, I can work fast and do it right the first time.
47. I can concentrate hard on anything I do.
48. My thinking is clear and rapid.
49. Life is so much fun; it seems to offer so many sources of fulfilment.
50. Things will be better and better today.
51. I can make decisions rapidly and correctly; and I can defend them against criticism easily.
52. I feel really industrious – I want something to do!
53. Life is firmly in my control.
54. I wish somebody would play some good loud music!
55. This is great – I really do feel good. I am elated about things.
56. I'm really feeling sharp now.
57. This is just one of those days when I'm ready to go!
58. I feel like bursting with laughter – I wish somebody would tell a joke and give me an excuse!
59. I'm full of energy.
60. God, I feel great!

Appendix 8a
Cue word list A

Instructions

You are about to take part in an autobiographical memory cueing experiment. You will be presented with a series of words describing everyday events. The words will be presented one at a time, and your task is to try to recall a discrete personal event which could be associated with each word. These events should be the first specific memory that comes to mind when you see each word. The events should have lasted seconds, minutes, or hours, but not days, weeks, or years. Upon recall of a memory associated with each word, you should write down a phrase, or sentence, which describes the memory. You will not have to reveal the exact nature of your memories to anyone else. Therefore, there is no need to censor, or sanitise, any of the memories. If you cannot recall a memory for any of the words, leave a blank space for that word. If you have any questions at all, please ask.

Bike
Tree
Shed
Supermarket

Appendix 8b
Cue word list B

Instructions

You are about to take part in an autobiographical memory cueing experiment. You will be presented with a series of words describing everyday events. The words will be presented one at a time, and your task is to try to recall a discrete personal event which could be associated with each word. These events should be the first specific memory that comes to mind when you see each word. The events should have lasted seconds, minutes, or hours, but not days, weeks, or years. Upon recall of a memory associated with each word, you should write down a phrase, or sentence, which describes the memory. You will not have to reveal the exact nature of your memories to anyone else. Therefore, there is no need to censor, or sanitise, any of the memories. If you cannot recall a memory for any of the words, leave a blank space for that word. If you have any questions at all, please ask.

Car
Flower
Garage
Shop

Appendix 8c
Cue word list

Instructions

You will be presented with a series of words describing everyday things. Please write down a phrase, or sentence, which describes your recalled event. There is no need to censor, or sanitise, any of the events. If you cannot recall an event for any of the words, leave a blank space for that word. If you have any questions at all, please ask.

Bike
Tree
Shed
Supermarket
Car
Flower
Garage
Shop
House
Road
Garden

Appendix 9
Automatic Thoughts Questionnaire (ATQ-30)

Listed below are a variety of thoughts that pop into people's heads. Please read each thought and indicate how frequently, if at all, each thought occurred to you over the last week. Please read each item carefully and circle the number which best matches your answer.

		Not at all	Some-times	Fairly often	Often	All the time
1.	I feel like I'm up against the world	1	2	3	4	5
2.	I'm no good	1	2	3	4	5
3.	Why can't I ever succeed?	1	2	3	4	5
4.	No one understands me.	1	2	3	4	5
5.	I've let people down.	1	2	3	4	5
6.	I don't think I can go on.	1	2	3	4	5
7.	I wish I were a better person	1	2	3	4	5
8.	I'm so weak	1	2	3	4	5
9.	My life's not going the way I want it to	1	2	3	4	5
10.	I'm so disappointed in myself	1	2	3	4	5
11.	Nothing feels good anymore	1	2	3	4	5
12.	I can't stand this any more	1	2	3	4	5
13.	I can't get started	1	2	3	4	5
14.	What's wrong with me?	1	2	3	4	5
15.	I wish I were somewhere else.	1	2	3	4	5
16.	I can't get things together	1	2	3	4	5
17.	I hate myself.	1	2	3	4	5
18.	I'm worthless.	1	2	3	4	5
19.	I wish I could just disappear	1	2	3	4	5
20.	What's the matter with me?	1	2	3	4	5
21.	I'm a loser	1	2	3	4	5
22.	My life is a mess.	1	2	3	4	5
23.	I'm a failure	1	2	3	4	5
24.	I'll never make it.	1	2	3	4	5
25.	I feel so helpless.	1	2	3	4	5

Appendix 9 Continued
Automatic Thoughts Questionnaire (ATQ-30)

		Not at all	Some times	Fairly often	Often	All the time
26.	Something has to change.	1	2	3	4	5
27.	There must be something wrong with me.	1	2	3	4	5
28.	My future is bleak.	1	2	3	4	5
29.	It's just not worth it.	1	2	3	4	5
30.	I can't finish anything.	1	2	3	4	5

Appendix 10
Sentence completion for events from the past test (SCEPT)

Instructions

Please answer **every** question, even if you find it difficult. Your answers will be kept entirely confidential. You should try to work quite quickly: there is no need to think very hard about the answers. The first answer you think of is usually the best.

1 I still remember well how

2 I still recall how/that I

3 Last year

4 In the past

5 Last week I

6 I can still picture how

7 When I think back to/of

8 I will never forget

9 The most important thing that I have ever

10 Last year I

11 At the time when I

Scoring: The content of autobiographical memories could be quantitatively coded as suggested by Williams and based on the Conway structure of autobiographical recall:

Semantic associates should score (1)
Categoric memories should score (2)
Extended memories should score (3)
Specific memories should score (4)

Appendix 11
Vulnerability screening questionnaire

Instructions

Your participation is entirely voluntary and all the information that you provide is confidential and will not be used for any other purpose other than the research project. Confidentiality will be assured by using your 6-digit random number which is only known by you.

Have you been prescribed treatment for depression in the past or present? (Please circle)

Yes No

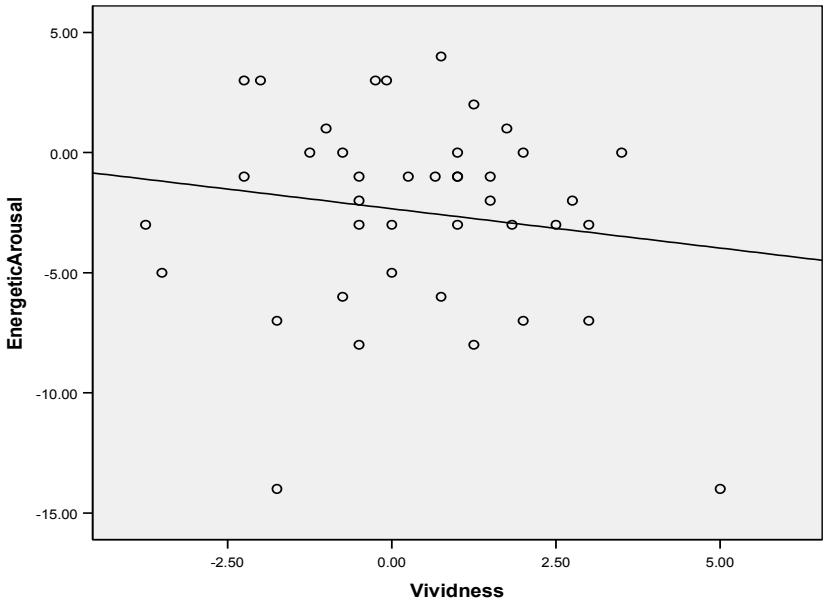
If yes, were you treated by (Please circle one or more):- Pharmacology

Cognitive therapy

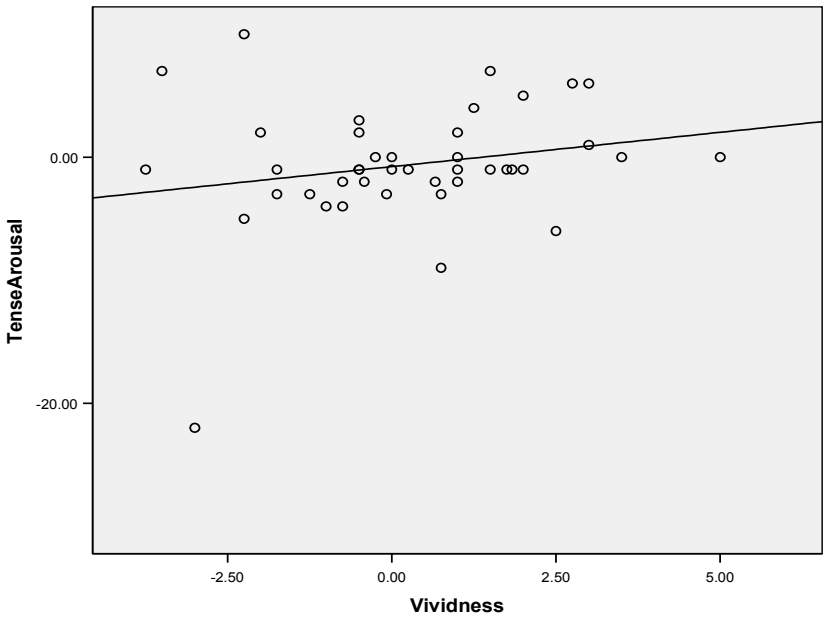
Counselling

Appendix 12
Scatter plot graphs

Scatter plot for change scores between energetic arousal and vividness

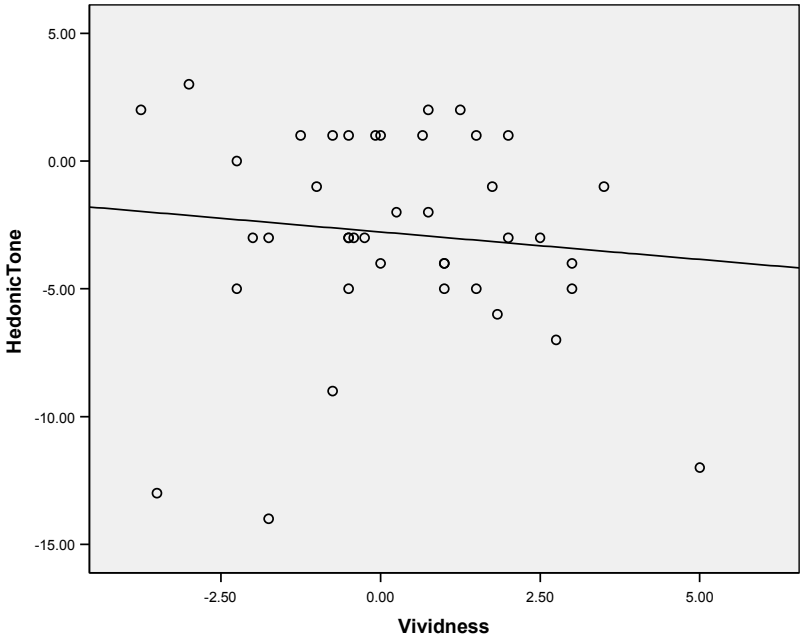


Scatter plot for change scores between tense arousal and vividness

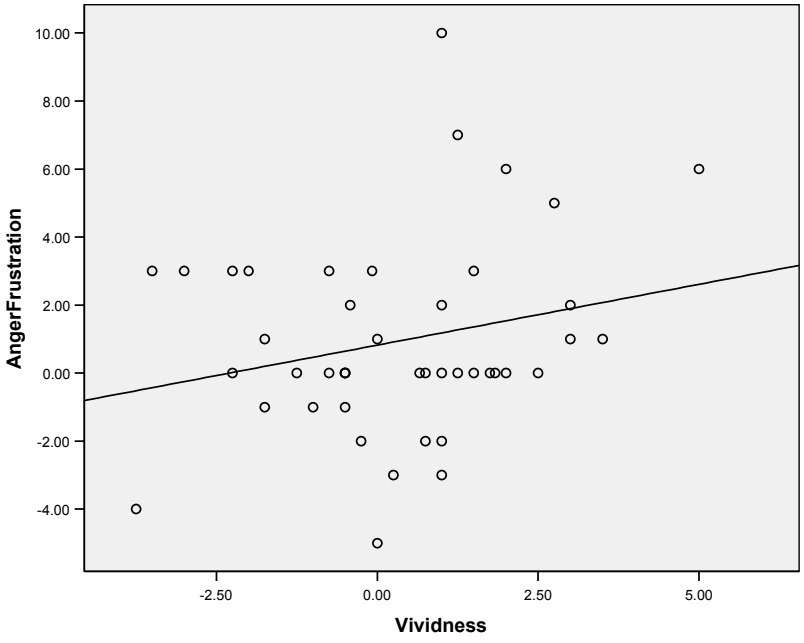


Appendix 12
Scatter plot graphs (Continued)

Scatter plot for change scores between hedonic tone and vividness

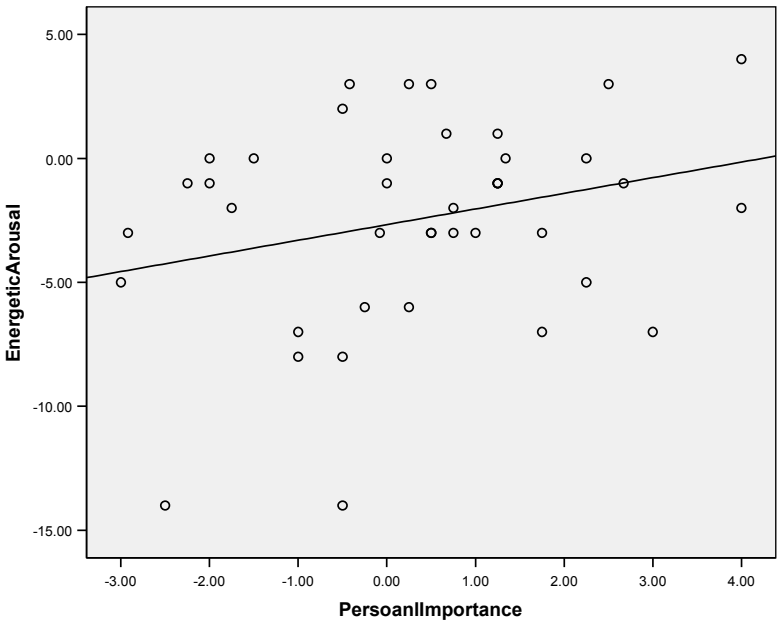


Scatter plot for change scores between anger/frustration and vividness



Appendix 12
Scatter plot graphs (Continued)

Scatter plot for change scores between energetic arousal and personal importance



Scatter plot for change scores between hedonic tone and personal importance